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CHILD-LIFE ARITHMETICS




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CHILD-LIFE ARITHMETICS

GRADE SIX

By

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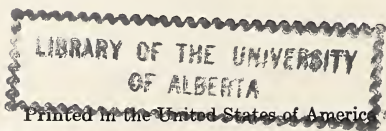
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Illustrated by
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MARIE O'HARA



INTRODUCTION

An institution is said to be nothing more than the elongated shadow of a man. Modern arithmetic in America is the lengthened shadow of Warren Colburn. It was he who in 1821 broke the monopolistic fetters of adult standards in this subject and gave to us our first real text for children. Today the Colburn-Pestalozzi tradition lives on in undiminished force. In our thinking about methods it has lifted the psychological processes of the child to a place of equal importance with the mathematical processes of the subject.

In their work of several years on this series of texts, authors and publishers alike have placed the demands of childhood in the front rank of preferred claims. This will explain the upward gradation of certain major topics; the more gradual development of complex computational processes; the use of relatively small units with their pleasant variety, page unity, and short attention span; the meticulous elimination of unnecessary vocabulary and other linguistic difficulties; the systematic introduction of arithmetical processes in social situations familiar to children; the painstaking attempt to make the necessary technical terms meaningful on their first occurrence; the carefully phrased explanations of new arithmetical processes; the conspicuous presentation of generalizations following their development and preceding their application; the wide variety of projects, whose interest appeal is enhanced by hundreds of beautiful illustrations in three and four colors; the adjustment to individual differences by a scientifically organized program of diagnostic testing with remedial exercises keyed thereto; and the definite provision of enrichment for the ablest pupils.

These and other features of the books are the direct result of a sustained endeavor to smooth the way of the child to competence by a more natural and scientific approach. And such an endeavor reflects the basic aspiration of all instructional methodology.

THE AUTHORS

121918

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CHAPTER I

GROWING STRONG IN ARITHMETIC

Reading Large Numbers

NUMBERS IN BOOKS AND MAGAZINES

1. In reading books and magazines we often find tables giving large numbers. How many people were living in urban (city) districts in each state mentioned in the table? How many in the rural districts?

State	Urban	Rural
Massachusetts	3,831,426	418,188
Connecticut	1,131,770	475,133
New York	10,521,952	2,066,114
New Jersey	3,339,244	702,090
Pennsylvania	6,533,511	3,097,839
Ohio	4,507,371	2,139,326
Illinois	5,635,727	1,994,927
Michigan	3,302,075	1,540,250
Minnesota	1,257,616	1,306,337
Iowa	979,292	1,491,647
Missouri	1,859,119	1,170,248

2. In the table below read the area of each river basin and tell how long the river is. What river is the longest?

River	Basin, Square Miles	Length, Miles
Amazon	2,500,000	3,400
Congo	1,500,000	2,900
Nile	1,400,000	3,670
Missouri-Mississippi	1,250,000	4,221

WE HEAR MUCH ABOUT MILLIONS TODAY

1. Here is a newspaper story, told in figures, of the money spent by our national government during the fifteen years from 1916 to 1930. Read aloud the number of dollars spent each year as shown in the table. The first number is read, 734 million, 56 thousand, 202 dollars. The second number is read, 1 billion, 977 million, 681 thousand, 751 dollars.

1916	\$ 734,056,202
1917	1,977,681,751
1918	12,697,836,706
1919	18,522,894,705
1920	6,482,090,191
1921	5,538,209,189
1922	3,795,302,500
1923	3,697,478,020
1924	3,506,677,715
1925	3,529,643,446
1926	3,584,987,874
1927	3,493,584,519
1928	3,643,519,875
1929	3,848,463,190
1930	3,988,872,886

2. In 1929, the last big year of business before the depression, some industries in this country each had a yearly output worth more than 2 billion dollars. Read the value of the products of these industries.

	Value of Products
Motor vehicles (not including Motorcycles)	\$3,717,997,000
Meat packing	3,394,673,000
Iron and steel work	3,356,894,000
Foundry and machine shops	2,751,679,000
Petroleum refining	2,611,681,000
Electrical machinery	2,273,654,000



GOOD ADDERS DO THESE RAPIDLY

1. Charles told his father that he needed these things for football: padded pants, \$1.48; sweater, \$2.19; helmet, \$.68; and cleats on shoes, \$.45. How much will all these cost?

$$\begin{array}{r}
 \$1.48 \\
 2.19 \\
 .68 \\
 .45 \\
 \hline
 \$4.80
 \end{array}$$

When Charles added the units' column he said, 17, 25, 30. He kept 17 in mind and added 8 to it. Then he kept 25 in mind and added 5 to it.

Add the tens: Say 7 (3+4), 8, —, —.

Add the dollars. Read the sum.

2. Combinations like those below are much used in addition. Say the sums.

19	24	17	26	15	28	11	29	12
<u>3</u>	<u>6</u>	<u>8</u>	<u>7</u>	<u>8</u>	<u>3</u>	<u>9</u>	<u>4</u>	<u>8</u>

15	17	26	19	24	28	12	29	17
<u>7</u>	<u>7</u>	<u>8</u>	<u>4</u>	<u>7</u>	<u>4</u>	<u>9</u>	<u>5</u>	<u>9</u>

19	15	24	19	26	18	28	16	29
<u>5</u>	<u>9</u>	<u>8</u>	<u>6</u>	<u>9</u>	<u>2</u>	<u>5</u>	<u>4</u>	<u>6</u>

13	24	27	28	27	29	19	18	25
<u>7</u>	<u>9</u>	<u>3</u>	<u>6</u>	<u>4</u>	<u>7</u>	<u>7</u>	<u>3</u>	<u>5</u>

4 Diagnostic Test in Addition

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples on this page. If you make mistakes in any row, she will have you do other examples of the same kind on the next page. She will sometimes have you do the work out loud for her.

Addition

1.	$\begin{array}{r} 4 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 42 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 17 \\ \hline \end{array}$	$\begin{array}{r} 564 \\ 325 \\ \hline \end{array}$
----	---	---	---	--	--	---

2.	$\begin{array}{r} 38 \\ 46 \\ \hline \end{array}$	$\begin{array}{r} 29 \\ 43 \\ \hline \end{array}$	$\begin{array}{r} 75 \\ 26 \\ \hline \end{array}$	$\begin{array}{r} 68 \\ 59 \\ \hline \end{array}$	$\begin{array}{r} 37 \\ 74 \\ \hline \end{array}$	$\begin{array}{r} 85 \\ 85 \\ \hline \end{array}$
----	---	---	---	---	---	---

3.	$\begin{array}{r} 538 \\ 319 \\ \hline \end{array}$	$\begin{array}{r} 408 \\ 912 \\ \hline \end{array}$	$\begin{array}{r} 611 \\ 399 \\ \hline \end{array}$	$\begin{array}{r} 509 \\ 701 \\ \hline \end{array}$	$\begin{array}{r} 650 \\ 850 \\ \hline \end{array}$	$\begin{array}{r} 428 \\ 652 \\ \hline \end{array}$
----	---	---	---	---	---	---

4.	$\begin{array}{r} 65 \\ 46 \\ 28 \\ 13 \\ 19 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 46 \\ 95 \\ 80 \\ 22 \\ \hline \end{array}$	$\begin{array}{r} 45 \\ 38 \\ 77 \\ 17 \\ 80 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 17 \\ 61 \\ 20 \\ 30 \\ \hline \end{array}$	$\begin{array}{r} 94 \\ 38 \\ 47 \\ 63 \\ 22 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 82 \\ 95 \\ 47 \\ 63 \\ \hline \end{array}$
----	---	---	---	---	---	---

5.	$\begin{array}{r} 3107 \\ 2093 \\ \hline \end{array}$	$\begin{array}{r} 7500 \\ 1900 \\ \hline \end{array}$	$\begin{array}{r} 6890 \\ 3119 \\ \hline \end{array}$	$\begin{array}{r} 4563 \\ 8769 \\ \hline \end{array}$	$\begin{array}{r} 3845 \\ 6855 \\ \hline \end{array}$	$\begin{array}{r} 8150 \\ 2550 \\ \hline \end{array}$
----	---	---	---	---	---	---

6.	$\begin{array}{r} 453 \\ 873 \\ 692 \\ 452 \\ \hline \end{array}$	$\begin{array}{r} 809 \\ 650 \\ 455 \\ 900 \\ \hline \end{array}$	$\begin{array}{r} 263 \\ 458 \\ 792 \\ 628 \\ \hline \end{array}$	$\begin{array}{r} 265 \\ 650 \\ 475 \\ 310 \\ \hline \end{array}$	$\begin{array}{r} 620 \\ 410 \\ 280 \\ 390 \\ \hline \end{array}$	$\begin{array}{r} 110 \\ 950 \\ 375 \\ 488 \\ \hline \end{array}$
----	---	---	---	---	---	---

7. $\$1.50 + \$.85 + \$3.75 + \$6.00 =$
 $\$7.55 + \$3.35 + \$1.48 + \$.10 =$

CURING OUR WEAK SPOTS

If you made mistakes in any row on page 4, do the row of the same number on this page.

Addition

1.	2	6	28	17	4	462
	4	5	31	5	6	515
	<u>3</u>	<u>7</u>	<u> </u>	<u> </u>	<u>16</u>	<u> </u>

2.	36	29	87	43	29	64
	<u>58</u>	<u>47</u>	<u>63</u>	<u>99</u>	<u>86</u>	<u>77</u>

3.	821	726	483	890	545	902
	<u>499</u>	<u>584</u>	<u>707</u>	<u>378</u>	<u>658</u>	<u>898</u>

4.	29	72	18	93	34	48
	47	50	74	47	62	86
	64	83	65	77	75	75
	85	97	36	58	82	39
	<u>43</u>	<u>28</u>	<u>57</u>	<u>84</u>	<u>46</u>	<u>57</u>

5.	4897	6549	2375	3285	4872	7807
	<u>3206</u>	<u>7804</u>	<u>5696</u>	<u>6497</u>	<u>9468</u>	<u>3598</u>

6.	654	807	954	707	647	384
	397	428	289	358	239	269
	408	654	462	295	409	456
	<u>324</u>	<u>267</u>	<u>545</u>	<u>476</u>	<u>321</u>	<u>274</u>

7.	$\$2.34 + \$4.57 + \$3.99 + \$5.86 =$
	$\$7.45 + \$4.43 + \$0.06 + \$5.05 =$
	$\$6.47 + \$2.09 + \$5.98 + \$1.14 =$
	$\$8.42 + \$1.18 + \$4.07 + \$0.96 =$

WHAT TO DO IS THE QUESTION

Read each problem. If you do not see at once how to solve it, ask yourself the following questions:

(a) What is wanted? (b) What is given? (c) What should be done?

If you cannot answer the questions after the first reading, read the problem again. If you know what is wanted and what is given, it will be easier to tell what should be done.

1. Harold sells papers after school and on Saturdays. Last week he earned \$2.57; the week before he earned \$3.01; this week he earned \$2.76. How much did he earn in the three weeks?

2. The total weight of the five boys on a basketball team is 715 pounds. Find the average weight.

3. Find how many square feet are in a garden that measures 75 feet by 64 feet.

4. There are 756 pupils in Fairview school. There are 519 pupils in Garfield school. How many more pupils are there in Fairview school than in Garfield school?

5. Mrs. Storm had 357 hens. She sold 98 of them. How many did she have left?

6. Jack and his parents made an automobile trip of 540 miles. It took them $2\frac{1}{2}$ days. What was the average distance covered in one day?

7. Dick is planning to attend a summer camp that costs \$10.25 each week. How much will it cost him for 8 weeks?



CLOTHING BILLS FOR THE BROWN FAMILY

1. Mrs. Brown bought the following clothing for her son, William:

1 suit	\$15.50	1 pair of	
1 cap	\$ 1.25	shoes	\$4.75

How much should she pay the clerk?

2. For her daughter, Jane, she bought the following:

1 dress	\$4.90	1 hat	\$3.50
1 dress	3.75	1 pair of	
1 dress	8.45	shoes	5.25

How much should she pay for Jane's clothes?

3. For herself she bought 1 coat, \$25.50; 1 hat, \$6.25; 1 dress, \$15.75. What was the bill for her clothes?

4. Mr. Brown bought for himself, 1 suit, \$35.00; 1 hat, \$4.50; 1 tie, \$1.25; 1 pair of shoes, \$5.50. What was the amount of his bill?

5. What was the total cost of the clothing for the whole family?



FINDING THE NUMBER OF PUPILS

The tables below and at the top of page 9 give the number of pupils in each grade in each of the schools in a western city.

Read each problem and write the sums on your paper.

1. Find the number of pupils in each school.
2. Find the number of pupils in each grade and in the kindergartens of the entire city.
3. Find the total number of pupils in the city.

Ray school		Broadway school		Wren school	
Kinderg'n.	82	Kinderg'n.	90	Kinderg'n.	58
Grade 1	78	Grade 1	118	Grade 1	60
Grade 2	81	Grade 2	102	Grade 2	57
Grade 3	76	Grade 3	98	Grade 3	42
Grade 4	72	Grade 4	120	Grade 4	37
Grade 5	79	Grade 5	140	Grade 5	86
Grade 6	68	Grade 6	136	Grade 6	78
Grade 7	84	Grade 7	114	Grade 7	69
Grade 8	76	Grade 8	110	Grade 8	66

Diagnostic Tests in Subtraction**FINDING OUR WEAK SPOTS****Subtraction**

1.	$\begin{array}{r} 7 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 16 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 74 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 55 \\ 43 \\ \hline \end{array}$	$\begin{array}{r} 80 \\ 50 \\ \hline \end{array}$	$\begin{array}{r} 785 \\ 421 \\ \hline \end{array}$
----	---	--	--	--	---	---	---

2.	$\begin{array}{r} 907 \\ 305 \\ \hline \end{array}$	$\begin{array}{r} 346 \\ 204 \\ \hline \end{array}$	$\begin{array}{r} 473 \\ 42 \\ \hline \end{array}$	$\begin{array}{r} 386 \\ 57 \\ \hline \end{array}$	$\begin{array}{r} 587 \\ 584 \\ \hline \end{array}$	$\begin{array}{r} 557 \\ 398 \\ \hline \end{array}$
----	---	---	--	--	---	---

3.	$\begin{array}{r} 8070 \\ 5849 \\ \hline \end{array}$	$\begin{array}{r} 6020 \\ 3275 \\ \hline \end{array}$	$\begin{array}{r} 3444 \\ 2588 \\ \hline \end{array}$	$\begin{array}{r} 9531 \\ 5497 \\ \hline \end{array}$	$\begin{array}{r} 5284 \\ 4875 \\ \hline \end{array}$	$\begin{array}{r} 7032 \\ 6406 \\ \hline \end{array}$
----	---	---	---	---	---	---

4.	$\$1.40 - \$0.90 = ?$	$\$8.47 - \$7.88 = ?$
	$\$6.00 - \$1.37 = ?$	$\$9.82 - \$5.09 = ?$

If you made mistakes in any row, do the remedial exercises of the same number below.

Remedial Exercises in Subtraction**CURING OUR WEAK SPOTS****Subtraction**

1.	$\begin{array}{r} 9 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 68 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 45 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 45 \\ 23 \\ \hline \end{array}$	$\begin{array}{r} 70 \\ 30 \\ \hline \end{array}$	$\begin{array}{r} 943 \\ 522 \\ \hline \end{array}$
----	---	--	--	--	---	---	---

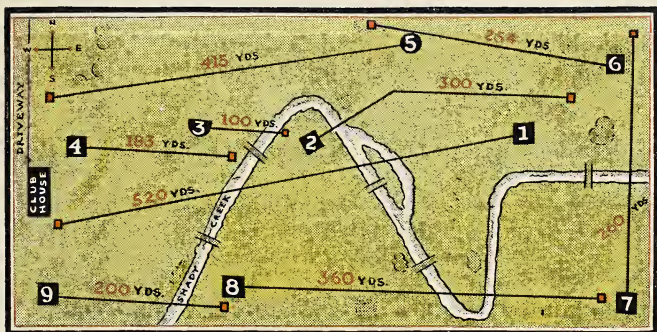
2.	$\begin{array}{r} 605 \\ 402 \\ \hline \end{array}$	$\begin{array}{r} 728 \\ 405 \\ \hline \end{array}$	$\begin{array}{r} 168 \\ 33 \\ \hline \end{array}$	$\begin{array}{r} 845 \\ 28 \\ \hline \end{array}$	$\begin{array}{r} 696 \\ 691 \\ \hline \end{array}$	$\begin{array}{r} 944 \\ 288 \\ \hline \end{array}$
----	---	---	--	--	---	---

3.	$\begin{array}{r} 6050 \\ 3967 \\ \hline \end{array}$	$\begin{array}{r} 6200 \\ 5899 \\ \hline \end{array}$	$\begin{array}{r} 1787 \\ 1298 \\ \hline \end{array}$	$\begin{array}{r} 5180 \\ 3875 \\ \hline \end{array}$	$\begin{array}{r} 4000 \\ 3555 \\ \hline \end{array}$	$\begin{array}{r} 9278 \\ 6588 \\ \hline \end{array}$
----	---	---	---	---	---	---

4.	$\$0.08 - \$0.03 = ?$	$\$9.35 - \$6.46 = ?$
	$\$1.50 - \$0.70 = ?$	$\$7.75 - \$4.08 = ?$
	$\$8.00 - \$2.25 = ?$	$\$3.75 - \$0.10 = ?$

WINNERS' PAGE

For the pupils who made no mistakes in the
tests on pages 4 and 10.



A COUNTRY CLUB GOLF COURSE

Play starts on the "tee" of Hole No. 1. This tee is shown as the little red square just below the Club House. The hole is shown by the black square with the white "1" in it. The distance from the tee to this hole is 520 yds. Hole No. 1 is 520 yards long.

1. What is the length of this nine-hole course in yards? In miles?

2. How much longer is the longest hole than the shortest hole?

3. Mr. Snyder often plays around the course twice. What is the entire length of the eighteen holes in yards? In miles?

4. Occasionally he plays only the following holes: 1, 7, 8, and 9. What is the length of those four holes?

ARE THESE HARD FOR YOU?

1. There are 526 pupils in the Spencer school and 347 in the Beal school. How many more pupils are there in the Spencer school than in the Beal?
 $526 - 347 = ?$

$$\begin{array}{r} 526 \\ 347 \\ \hline 179 \\ \hline 526 \end{array}$$

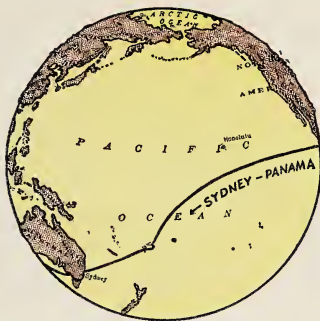
Think: 7 from 16, 9. Write 9.
 5 from 12, 7. Write 7.
 4 from 5, 1. Write 1.
 The difference is 179.

Check by adding the subtrahend and the difference.

When the figure in the subtrahend is larger than the figure above it in the minuend, add 10 to the minuend figure and add 1 to the next left-hand figure in the subtrahend. Adding 10 in units' place is the same as adding 1 in tens' place.

Subtract and check:

2.	$\begin{array}{r} 65 \\ 19 \\ \hline \end{array}$	$\begin{array}{r} 87 \\ 28 \\ \hline \end{array}$	$\begin{array}{r} 63 \\ 14 \\ \hline \end{array}$	$\begin{array}{r} 55 \\ 37 \\ \hline \end{array}$	$\begin{array}{r} 92 \\ 45 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ 17 \\ \hline \end{array}$
3.	$\begin{array}{r} 641 \\ 98 \\ \hline \end{array}$	$\begin{array}{r} 436 \\ 59 \\ \hline \end{array}$	$\begin{array}{r} 302 \\ 28 \\ \hline \end{array}$	$\begin{array}{r} 47 \\ 39 \\ \hline \end{array}$	$\begin{array}{r} 93 \\ 46 \\ \hline \end{array}$	$\begin{array}{r} 228 \\ 65 \\ \hline \end{array}$
4.	$\begin{array}{r} 843 \\ 579 \\ \hline \end{array}$	$\begin{array}{r} 657 \\ 483 \\ \hline \end{array}$	$\begin{array}{r} 946 \\ 658 \\ \hline \end{array}$	$\begin{array}{r} 416 \\ 227 \\ \hline \end{array}$	$\begin{array}{r} 800 \\ 313 \\ \hline \end{array}$	$\begin{array}{r} 694 \\ 307 \\ \hline \end{array}$
5.	$\begin{array}{r} 523 \\ 490 \\ \hline \end{array}$	$\begin{array}{r} 909 \\ 630 \\ \hline \end{array}$	$\begin{array}{r} 2416 \\ 322 \\ \hline \end{array}$	$\begin{array}{r} 6573 \\ 428 \\ \hline \end{array}$	$\begin{array}{r} 4695 \\ 787 \\ \hline \end{array}$	$\begin{array}{r} 7802 \\ 578 \\ \hline \end{array}$
6.	$\begin{array}{r} 3550 \\ 498 \\ \hline \end{array}$	$\begin{array}{r} 8021 \\ 565 \\ \hline \end{array}$	$\begin{array}{r} 5343 \\ 727 \\ \hline \end{array}$	$\begin{array}{r} 3900 \\ 456 \\ \hline \end{array}$	$\begin{array}{r} 2874 \\ 1932 \\ \hline \end{array}$	$\begin{array}{r} 8401 \\ 3975 \\ \hline \end{array}$



A TRIP TO TAKE

One of the most interesting ways to go from New York to Australia is on a steamship line that takes us around the world. Distances are shown below in nautical miles. A nautical or sea mile contains 6080 ft. Here is the route:

Parts of Trip	Nautical Miles	Days
New York to Panama (not shown on map)	1974	8
Panama to Sidney	7796	29
On Australian coast	2665	30
Fremantle to India	3677	14
India to New York	8350	36

1. What is the entire distance?
2. How many days will it take to make the trip?
3. How much longer is the longest part of the trip than the shortest part of the trip?
4. Which is the longest part of the trip in days?



GOOD MULTIPLIERS DO THESE FAST

1. David's father runs a small dry goods store. Yesterday he ordered 6 shirts at \$.87 each. What will they cost?

\$.87
6
—

David said $6 \times 7 = 42$, wrote 2 and kept 4 in mind. Then he said, " $6 \times 8 = 48$, and 4 is 52." He kept 48 in mind and added the 4 to it.

Your teacher will read some of the other addition combinations used in multiplication, like $45 + 8$. They are given here below. Write the sums. Your teacher will say them as fast as you can do them.

45	36	49	64	63	48	63
8	4	2	7	8	6	7
—	—	—	—	—	—	—
48	36	48	48	56	54	49
5	6	3	7	4	7	4
—	—	—	—	—	—	—
49	35	54	56	36	49	45
6	6	8	5	7	5	7
—	—	—	—	—	—	—

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples on this page. If you make mistakes in any row, she will have you do others of the same kind on the next page. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her.

Multiplication

1.	$\begin{array}{r} 9 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 23 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 52 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 85 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 323 \\ 3 \\ \hline \end{array}$
2.	$\begin{array}{r} 501 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 630 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 400 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 833 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 746 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 573 \\ 7 \\ \hline \end{array}$
3.	$\begin{array}{r} 41 \\ 22 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ 31 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ 12 \\ \hline \end{array}$	$\begin{array}{r} 38 \\ 25 \\ \hline \end{array}$	$\begin{array}{r} 90 \\ 58 \\ \hline \end{array}$	$\begin{array}{r} 87 \\ 67 \\ \hline \end{array}$
4	$\begin{array}{r} 513 \\ 22 \\ \hline \end{array}$	$\begin{array}{r} 420 \\ 44 \\ \hline \end{array}$	$\begin{array}{r} 613 \\ 20 \\ \hline \end{array}$	$\begin{array}{r} 803 \\ 67 \\ \hline \end{array}$	$\begin{array}{r} 485 \\ 55 \\ \hline \end{array}$	$\begin{array}{r} 295 \\ 28 \\ \hline \end{array}$
5.	$\begin{array}{r} 613 \\ 300 \\ \hline \end{array}$	$\begin{array}{r} 314 \\ 102 \\ \hline \end{array}$	$\begin{array}{r} 637 \\ 280 \\ \hline \end{array}$	$\begin{array}{r} 506 \\ 578 \\ \hline \end{array}$	$\begin{array}{r} 136 \\ 485 \\ \hline \end{array}$	$\begin{array}{r} 737 \\ 804 \\ \hline \end{array}$
6.	$\begin{array}{r} 6202 \\ 432 \\ \hline \end{array}$	$\begin{array}{r} 7003 \\ 656 \\ \hline \end{array}$	$\begin{array}{r} 6738 \\ 957 \\ \hline \end{array}$	$\begin{array}{r} 3503 \\ 108 \\ \hline \end{array}$	$\begin{array}{r} 5953 \\ 400 \\ \hline \end{array}$	$\begin{array}{r} 1706 \\ 109 \\ \hline \end{array}$
7.	$\begin{array}{r} \$.84 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} \$1.30 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} \$.08 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} \$3.37 \\ 86 \\ \hline \end{array}$	$\begin{array}{r} \$17.00 \\ 53 \\ \hline \end{array}$	$\begin{array}{r} \$.50 \\ 80 \\ \hline \end{array}$
8.	$\begin{array}{r} \$.72 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} \$1.10 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} \$.10 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} \$4.05 \\ 22 \\ \hline \end{array}$	$\begin{array}{r} \$18.20 \\ 81 \\ \hline \end{array}$	$\begin{array}{r} \$.30 \\ 10 \\ \hline \end{array}$

16 Remedial Exercises in Multiplication

CURING OUR WEAK SPOTS

Use these examples after the test on page 15. If you made mistakes in any row in the test, do the examples in the row of the same number.

Multiplication

1.	$\begin{array}{r} 7 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 70 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 26 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 47 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 242 \\ 2 \\ \hline \end{array}$
2.	$\begin{array}{r} 201 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 440 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 600 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 626 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 476 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 948 \\ 6 \\ \hline \end{array}$
3.	$\begin{array}{r} 34 \\ 12 \\ \hline \end{array}$	$\begin{array}{r} 23 \\ 32 \\ \hline \end{array}$	$\begin{array}{r} 31 \\ 13 \\ \hline \end{array}$	$\begin{array}{r} 45 \\ 28 \\ \hline \end{array}$	$\begin{array}{r} 67 \\ 53 \\ \hline \end{array}$	$\begin{array}{r} 90 \\ 85 \\ \hline \end{array}$
4.	$\begin{array}{r} 812 \\ 33 \\ \hline \end{array}$	$\begin{array}{r} 520 \\ 42 \\ \hline \end{array}$	$\begin{array}{r} 733 \\ 20 \\ \hline \end{array}$	$\begin{array}{r} 502 \\ 77 \\ \hline \end{array}$	$\begin{array}{r} 876 \\ 29 \\ \hline \end{array}$	$\begin{array}{r} 428 \\ 43 \\ \hline \end{array}$
5.	$\begin{array}{r} 903 \\ 200 \\ \hline \end{array}$	$\begin{array}{r} 213 \\ 203 \\ \hline \end{array}$	$\begin{array}{r} 657 \\ 390 \\ \hline \end{array}$	$\begin{array}{r} 423 \\ 584 \\ \hline \end{array}$	$\begin{array}{r} 805 \\ 658 \\ \hline \end{array}$	$\begin{array}{r} 258 \\ 705 \\ \hline \end{array}$
6.	$\begin{array}{r} 3003 \\ 123 \\ \hline \end{array}$	$\begin{array}{r} 5003 \\ 546 \\ \hline \end{array}$	$\begin{array}{r} 5498 \\ 576 \\ \hline \end{array}$	$\begin{array}{r} 2508 \\ 206 \\ \hline \end{array}$	$\begin{array}{r} 6954 \\ 400 \\ \hline \end{array}$	$\begin{array}{r} 2805 \\ 209 \\ \hline \end{array}$
7.	$\begin{array}{r} \$.66 \\ 7 \\ \hline \\ \$.48 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} \$1.45 \\ 5 \\ \hline \\ \$1.03 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} \$.03 \\ 8 \\ \hline \\ \$.80 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} \$6.58 \\ 25 \\ \hline \\ \$3.73 \\ 68 \\ \hline \end{array}$	$\begin{array}{r} \$14.00 \\ 48 \\ \hline \\ \$17.00 \\ 35 \\ \hline \end{array}$	$\begin{array}{r} \$.30 \\ 60 \\ \hline \\ \$.05 \\ 80 \\ \hline \end{array}$

ALICE'S PICTURES



1. At summer camp Alice took pictures of pretty scenery and of the many interesting activities. She sold the pictures to her friends. For a size A picture she had to pay $4\frac{1}{2}\text{¢}$ for film, $2\frac{1}{2}\text{¢}$ for developing, 7¢ for printing, and also 5¢ for mounting. How much did a picture of this size cost Alice?

2. How much did a picture, size B, cost her if she paid $6\frac{1}{2}\text{¢}$ for film, $2\frac{1}{2}\text{¢}$ for developing, 9¢ for printing, and $7\frac{1}{2}\text{¢}$ for mounting?

3. How much more did a size B picture cost her than a size A?

4. She sold each size A picture for 25¢ . How much money did she make on one of these pictures?

5. She sold 38 size A pictures. How much money did she make on this number of size A pictures?

6. She sold each size B picture for 35¢ . How much money did she make on one of these pictures?

7. She sold 27 size B pictures. How much money did she make on this number of size B pictures?

8. How much money did Alice make altogether on the 38 size A pictures and the 27 size B pictures?

THESE WILL MAKE YOU THINK

1. Jack's father pays 35¢ a month for a magazine. How much does he pay for the magazine in a year?

2. Jack found out that the magazine would cost only \$3.00 if his father subscribed for it by the year. How much would he save by taking a year's subscription?

3. Ralph wants to have a fence around his tennis court. The amount of fence needed is 260 feet. How much will the fencing cost at \$.90 a foot?

4. During the month of April, Mrs. Black's grocery bills for a family of four were as follows:

First week	\$13.56	Third week	\$14.75
Second week	10.28	Fourth week	12.16

What was the total amount of her grocery bill for the four weeks?

5. A farmer's cows produced 1527 pounds of butter fat in a year. What was the value of the butter fat at an average of 28¢ a pound?

6. In 1931 the number of persons between the ages of 6 and 21 in the city of Mishawaka, Indiana was 7,385. In 1932 it was 7,496. What was the increase?

7. Mrs. Thompson raises garden flowers to sell. Here is the record of her sales for four weeks:

First week	\$9.45	Third week	\$12.75
Second week	7.90	Fourth week	8.35

Find the amount of her sales for the four weeks.

DO THESE WITHOUT WRITING

1. Sam's mother said their family grocery bill for last week was \$19.53. What was the average cost for groceries each day of the week? $\$19.53 \div 7 = ?$

$\begin{array}{r} \$ 2.79 \\ 7 \overline{) \$19.53} \end{array}$
--

Sam figured it out. He said, "How many 7's in 19?" Then, "How many 7's in 55?" And last, "How many 7's in 63?" Can you show where he had to take 14 from 19 and 49 from 55 without writing the numbers?

Your teacher will read these subtraction combinations which are used in division. She will say the subtrahend first, as 14 from 20. Write the difference on your paper.

<u>20</u>	<u>31</u>	<u>54</u>	<u>41</u>	<u>51</u>	<u>53</u>	<u>62</u>	<u>52</u>	<u>31</u>
<u>14</u>	<u>28</u>	<u>49</u>	<u>36</u>	<u>48</u>	<u>49</u>	<u>56</u>	<u>49</u>	<u>24</u>

<u>53</u>	<u>30</u>	<u>52</u>	<u>30</u>	<u>63</u>	<u>20</u>	<u>55</u>	<u>32</u>	<u>43</u>
<u>45</u>	<u>24</u>	<u>48</u>	<u>28</u>	<u>56</u>	<u>18</u>	<u>49</u>	<u>28</u>	<u>36</u>

<u>53</u>	<u>30</u>	<u>22</u>	<u>31</u>	<u>70</u>	<u>33</u>	<u>44</u>	<u>54</u>	<u>60</u>
<u>48</u>	<u>27</u>	<u>18</u>	<u>27</u>	<u>63</u>	<u>28</u>	<u>36</u>	<u>48</u>	<u>54</u>

<u>71</u>	<u>32</u>	<u>34</u>	<u>23</u>	<u>55</u>	<u>50</u>	<u>61</u>	<u>70</u>	<u>24</u>
<u>63</u>	<u>27</u>	<u>28</u>	<u>18</u>	<u>48</u>	<u>45</u>	<u>54</u>	<u>64</u>	<u>18</u>

<u>33</u>	<u>25</u>	<u>51</u>	<u>50</u>	<u>21</u>	<u>71</u>	<u>34</u>	<u>40</u>	<u>23</u>
<u>27</u>	<u>18</u>	<u>45</u>	<u>49</u>	<u>16</u>	<u>64</u>	<u>27</u>	<u>35</u>	<u>16</u>

<u>52</u>	<u>51</u>	<u>60</u>	<u>80</u>	<u>26</u>	<u>20</u>	<u>35</u>	<u>40</u>	<u>62</u>
<u>45</u>	<u>49</u>	<u>56</u>	<u>72</u>	<u>18</u>	<u>16</u>	<u>27</u>	<u>36</u>	<u>54</u>

SELLING PEACHES

1. Mr. Brown sold 53 crates of peaches for \$65.72. All were sold at the same price. How much did he charge for each crate? $\$65.72 \div 53 = ?$

Divide

$$\begin{array}{r}
 \$ 1.24 \\
 53 \overline{) \$65.72} \\
 \underline{53} \\
 127 \\
 \underline{106} \\
 212 \\
 \underline{212} \\
 0
 \end{array}$$

Place the decimal point in the quotient over the decimal point in the dividend.

Divide as you would with any numbers.

Mr. Brown charged \$1.24 for each crate of peaches.

Check

$$\begin{array}{r}
 \$ 1.24 \\
 \underline{53} \\
 372 \\
 \underline{620} \\
 \$65.72
 \end{array}$$

2. Divide 3924 by 56.

$$\begin{array}{r}
 70\frac{4}{56} \\
 56 \overline{) 3924} \\
 \underline{392} \\
 4
 \end{array}$$

$392 \div 56 = ?$ 5 in 39, 7 times.

Write 7 in the quotient. Where? $7 \times 56 = 392$. Subtract.

Bring down 4. $4 \div 56 = 0$, 4 r.

The quotient is $70\frac{4}{56}$.

3. Carl Jackson received \$54.60 for 84 hens. What average price did he receive for a hen?

4. If a train is running 60 miles an hour, how many feet does it run in $\frac{1}{2}$ minute? (1 mi. = 5280 ft.)

$$5. \quad 85 \overline{) \$276.25}$$

$$62 \overline{) \$252.34}$$

$$40 \overline{) \$334.40}$$

$$6. \quad 20 \overline{) \$652.80}$$

$$78 \overline{) \$344.76}$$

$$93 \overline{) \$1581}$$

$$7. \quad 55 \overline{) \$114.95}$$

$$36 \overline{) \$288}$$

$$43 \overline{) \$219.30}$$

$$8. \quad 67 \overline{) \$273.36}$$

$$21 \overline{) \$99.75}$$

$$98 \overline{) \$980}$$

$$9. \quad 72 \overline{) \$5.76}$$

$$77 \overline{) \$80.85}$$

$$92 \overline{) \$333.96}$$

10. Divide 9600 by 24.

$$\begin{array}{r} 400 \\ 24 \overline{)9600} \\ \underline{96} \\ 00 \end{array}$$

Say the steps used in getting the quotient 400.

Be sure you know why there are 2 zeros in the quotient.

11. Divide 33503 by 67.

$$\begin{array}{r} 500\frac{3}{67} \\ 67 \overline{)33503} \\ \underline{335} \\ 03 \end{array}$$

Say the steps used in getting the quotient $500\frac{3}{67}$.

Be sure you know why there are 2 zeros in the quotient.

12. Jean's father drives his car at an average speed of 48 miles an hour. How many hours actual driving will he need to do in going 2412 miles?

13. Mr. Clark used 44 gallons of gasoline in driving his car 682 miles. What was the average number of miles he drove on a gallon of gasoline?

14. $32 \overline{)2240}$

$75 \overline{)6000}$

$93 \overline{)6522}$

15. $44100 \div 63$

$23600 \div 59$

$4378 \div 87$

16. $48 \overline{)14420}$

$69 \overline{)4156}$

$56 \overline{)4955}$

17. $5916 \div 29$

$33580 \div 73$

$17399 \div 47$

18. $36 \overline{)14412}$

$74 \overline{)6586}$

$85 \overline{)85170}$

19. $74038 \div 48$

$60030 \div 15$

$79336 \div 38$

20. $58 \overline{)59066}$

$82 \overline{)16564}$

$19 \overline{)7800}$

21. $60024 \div 26$

$20490 \div 34$

$42168 \div 84$

22. $18 \overline{)54072}$

$63 \overline{)12852}$

$59 \overline{)93786}$

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples in this test. If you make mistakes in any row, she will have you do others of the same kind at the bottom of the page. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her.

Division

1. $20\overline{)80}$ $30\overline{)66}$ $36\overline{)72}$ $42\overline{)84}$ $30\overline{)75}$ $16\overline{)80}$
2. $27\overline{)567}$ $35\overline{)805}$ $43\overline{)473}$ $29\overline{)406}$ $33\overline{)561}$ $24\overline{)816}$
3. $20\overline{)140}$ $48\overline{)192}$ $37\overline{)185}$ $74\overline{)592}$ $18\overline{)108}$ $22\overline{)165}$
4. $54\overline{)1404}$ $43\overline{)1333}$ $31\overline{)1395}$ $22\overline{)1243}$ $53\overline{)3657}$
5. $68\overline{)20468}$ $22\overline{)88066}$ $19\overline{)57190}$ $18\overline{)37260}$

Remedial Exercises in Division**CURING OUR WEAK SPOTS**

Use these examples after the above test.

Division

1. $30\overline{)90}$ $20\overline{)45}$ $32\overline{)64}$ $37\overline{)74}$ $25\overline{)80}$ $15\overline{)75}$
2. $23\overline{)966}$ $62\overline{)682}$ $21\overline{)504}$ $35\overline{)665}$ $28\overline{)476}$ $23\overline{)966}$
3. $50\overline{)250}$ $34\overline{)272}$ $44\overline{)308}$ $26\overline{)156}$ $18\overline{)162}$ $38\overline{)304}$
4. $42\overline{)2562}$ $64\overline{)2592}$ $66\overline{)1782}$ $53\overline{)1908}$ $65\overline{)2405}$
5. $13\overline{)52104}$ $35\overline{)21350}$ $25\overline{)51050}$ $74\overline{)148740}$

WINNERS' PAGE

For the pupils who made no mistakes on pages 15 and 22.

1. Helen's mother is going to buy a new vacuum cleaner. The total cost is \$49.50. The terms are \$5.50 down and the balance in 12 monthly payments. What is the total amount to be paid in monthly payments? What is the amount of each monthly payment?

2. Mrs. Ford's grocery bill for a family of six amounted to \$18.06 last week. What was the daily average for the family? What was the daily average for each person?

3. Here are Mrs. Thompson's gas bills for the first six months of the year:

January	\$3.28	April	\$2.68
February	3.54	May	3.04
March	2.98	June	2.76

What was the total amount for the six months?

4. The area of Canada is 3,690,043 square miles. The area of continental United States (the 48 states) is 3,026,789 square miles. How much greater is the area of Canada than that of the United States?

5. During the month of May, Mrs. Bronson sold 276 dozen eggs at 22¢ a dozen. How much did she receive for all the eggs?

6. Jack's father earns \$48.50 a week in an office. If he works 50 weeks during the year, how much does he earn?



WHAT MR. LUTHER LEARNED ABOUT HIS CAR

Mr. Luther bought a new car. He kept a record of his expenses for the first year. Here is the list:

Gasoline		Insurance	\$44.00
(925 gal.)	\$186.75	Cleaning and	
Oil and grease	42.50	polishing	18.50
Added equipment	27.35	Garage	60.00
Repairs	36.80		

1. What was the total expense for the first year?
2. What was the average monthly expense?
3. Find the average daily expense. (365 days)
4. At the end of the first month the register on the speedometer showed 952 miles. At the end of the second month it showed 1684 miles. How far did the car run in the second month?
5. At the end of the sixth month the register showed 9057 miles. How many miles had the car run during the time between the end of the second month and the end of the sixth month?
6. At the end of the year the speedometer read 17,006 miles. How many miles had the car run during the second six months of the year?

HOW NEAR CAN YOU COME?



When we are buying things, we often want to know about what the cost will be without using a pencil.

1. A clerk weighs a piece of meat for you. It weighs 3 pounds. It costs $16\frac{1}{2}\text{¢}$ per pound. You have 50¢ in your pocket. Have you enough money to buy the meat? $3 \times 16\frac{1}{2}\text{¢} = ?$

It is good practice to **estimate the answer** to a problem. Then solve it to see if your estimate is close. Estimating will help you to see if you get a reasonable answer.

2. If 1 pound of coffee costs 45¢ , what will $3\frac{3}{4}$ pounds cost?

Estimating the Cost

$3\frac{3}{4}$ lb. nearly equals 4 lb.; 45¢ is a little more than 42¢ .

A little more coffee at a little lower price will cost about the same.

$4 \times 42\text{¢} = \$1.68$, the estimated cost.

Finding the Actual Cost

$3\frac{3}{4} \times 45\text{¢} = \frac{15}{4} \times 45\text{¢} = \frac{675}{4}\text{¢} = 168\frac{3}{4}\text{¢}$ or $\$1.69$

3. A meat dealer offered me a chicken weighing $3\frac{7}{8}$ pounds for $\$1.24$. What was the price a pound?

4. A truck loaded with coal weighed 9515 pounds. The empty truck weighed 5010 pounds. How much did the coal weigh? About how many tons?

FINDING HOW WELL YOU CAN SOLVE PROBLEMS

Time, 20 minutes. Your score will be the number of problems you solve correctly in the time allowed. Your teacher will judge your accuracy in estimating each answer.

1. On four Tuesdays in November Dick banked the following amounts of money: \$.52, \$.95, \$1.08, \$.45. How much did he bank in all?

	Scale	Score
A	Excellent	= 7 or 6
B	Good	= 5
C	Fair	= 4 or 3
D	Poor	= 2 to 0

2. Jane's father pays \$48 rent per month. How much rent does he pay in a year?

3. Mr. Fisher had \$248.25 in the bank. He drew out \$124.75 to pay a bill. How much did he have left in the bank?

4. Mrs. Jones bought three books at the bookstore. The prices were as follows: \$1.90, \$2.25, and \$1.50. What was the bill for all three books?

5. A bushel of oats weighs 32 pounds. How many bushels are there in a load of oats weighing 3,300 pounds?

6. Ralph spends $5\frac{3}{4}$ hours in school each school day. How many hours does he spend in school in 20 school days?

7. If the average number of words in a line is 12 and the average number of lines on a page is 29, what is the average number of words on the pages of the book?

READING THE PROBLEM CORRECTLY

This test will help you to know how well you understand and solve problems. Your teacher will give you time enough to do your best work. Write the answers on your paper.

A. Mrs. Allen bought Elsie a dress, a coat, and a hat. They cost \$28.68. After paying the bill, Mrs. Allen found she had \$4.38 left. If she spent no money for anything else, how much money had she before buying Elsie's clothes?

Read each statement following a problem, then pick out and write the best answer.

1. Before buying Elsie's clothes, Mrs. Allen had

- | | |
|-------------|------------------------|
| (a) \$28.68 | (c) $\$28.68 + \4.38 |
| (b) \$ 4.38 | (d) $\$28.68 - \4.38 |

2. The problem says Mrs. Allen spent

- (a) no money for anything.
- (b) all the money she had.
- (c) all but \$28.68 of her money.
- (d) all but \$ 4.38 of her money.

B. A wagon loaded with coal weighed 4528 lb. The wagon alone weighed 1025 lb. What was the weight of the coal?

1. The coal weighed

- | | |
|--------------|---|
| (a) 4528 lb. | (c) $4528 \text{ lb.} + 1025 \text{ lb.}$ |
| (b) 1025 lb. | (d) $4528 \text{ lb.} - 1025 \text{ lb.}$ |

2. The problem says

- | | |
|---------------------------------|--------------|
| (a) The wagon weighed 4528 lb.; | (b) 1025 lb. |
| (c) The coal weighed 4528 lb.; | (d) 1025 lb. |

C. Five boys were going by train to Camp Care-free. The railroad fare was \$2.50 for each boy. John had a \$10 bill in his pocket. Did he have enough money to buy the five tickets?

1. The cost of the five railroad tickets was

- | | |
|------------------------|-----------------------|
| (a) \$10 | (c) $5 \times \$2.50$ |
| (b) $10 \times \$2.50$ | (d) \$2.50 |

2. The problem says

- (a) John had \$5 in his pocket.
- (b) John had \$10 in his pocket.
- (c) Five tickets would cost \$10.
- (d) Five tickets would cost \$2.50.

D. Richard and his brother Tom went together to buy a camera that cost \$4.40. Each paid half the cost. How much did Richard have left from a \$5 bill, after paying his share?

1. Richard had left

- | | |
|------------|---------------------------------|
| (a) \$5 | (c) $\$5 - \2.20 |
| (b) \$4.40 | (d) $\frac{1}{2} \times \$4.40$ |

2. The problem says

- (a) Each had \$4.40 to pay.
- (b) Each had a \$5 bill.
- (c) The camera cost \$5.
- (d) The camera cost \$4.40.

If you made mistakes in this test, read all problems after this more carefully.

CHAPTER II

MASTERING FRACTIONS

Changing Fractions to Lowest Terms



1. Roy had 80 cents. His father asked him what part of a dollar he had. $\frac{80}{100} = ?$

$$\frac{80 \div 10}{100 \div 10} = \frac{8}{10}$$

$$\frac{8 \div 2}{10 \div 2} = \frac{4}{5}$$

Roy thought: $80\text{¢} = \frac{80}{100}$ dollar.

Change $\frac{80}{100}$ to lower terms by dividing both numerator and denominator by 10. $\frac{80}{100} = \frac{8}{10}$

Change $\frac{8}{10}$ to lowest terms by dividing both numerator and denominator by 2. $\frac{8}{10} = \frac{4}{5}$

Roy had $\frac{4}{5}$ dollar.

2. Roy's father asked him by what one number he could divide both 80 and 100, so as to change $\frac{80}{100}$ to the lowest terms.

$$\frac{80 \div 20}{100 \div 20} = \frac{4}{5}$$

Roy thought: I divided by 10 and then by 2. I could have divided by 20.

30 Changing Fractions to Lowest Terms

1. There are 600 children enrolled in the Riley school. On Monday 560 children were present. What fraction shows the part of the school children present on that day? Reduce to lowest terms. $\frac{560}{600} = ?$

2. May is reading the book, "Heidi." The book has 256 pages, and May has read 192 pages in it. What part of the book has she read?

3. Jane is selling tickets for a school play. She took 24 tickets to sell. She has sold 18. What part of her tickets has she sold?

4. Jim and his father are driving from their home to Denver. The distance is 840 miles. When the speedometer on their car shows that they have gone 720 miles, what part of the trip have they covered?

To change or reduce a fraction to lowest terms, divide both terms by the largest number that will divide them without a remainder.

Change to lowest terms.

A	B	C	D
5. $\frac{20}{35}$	$\frac{9}{27}$	$\frac{12}{60}$	$\frac{12}{90}$
6. $\frac{16}{80}$	$\frac{24}{56}$	$\frac{21}{35}$	$\frac{35}{50}$
7. $\frac{14}{42}$	$\frac{15}{75}$	$\frac{25}{60}$	$\frac{16}{48}$
8. $\frac{18}{72}$	$\frac{22}{55}$	$\frac{8}{48}$	$\frac{30}{45}$

USING FRACTIONS IN OUR THINKING

1. Dick has 30¢ to spend for candy that costs 40¢ a pound. What part of a pound can he buy?

2. A dealer bought a gross of pencils (144). He sold 96 of them in one week. What part of a gross did he sell?

3. The gasoline tank in Mr. Green's car holds 20 gallons. He uses 16 gallons in making a trip to Lake Geneva. What part of a full tank does he use?

4. Mr. Johnson is an Oklahoma farmer who owns 360 acres of land. He sells 80 acres. What part of all his land does he sell?

5. Ralph had 90¢. He spent 18¢ for a tablet and pencils. What part of his money did he spend?

6. The Longfellow school has an enrollment of 375 children. Sixty children in the school are given milk every morning at recess. What part of all the children in the school are given milk?

7. In Martha's room there are 40 pupils. On last Tuesday 32 of them put money in the school bank. What part of all the children put money in the bank?

8. Mr. Snow owned 180 head of sheep. He sold 45 of them. What part of all his sheep did he sell?

9. Anna and her parents took an automobile trip. They planned to go 225 miles the first day. By noon they had traveled 125 miles. What part of the day's journey had they covered by noon?

THESE SHOULD NOT BE HARD

1. George's mother baked an apple pie on Monday, and cut it into 8 pieces of equal size. Three of the pieces were eaten for lunch on Monday, and four for lunch on Tuesday. How much of the pie was eaten on the two days? $\frac{3}{8} + \frac{4}{8} = ?$

In adding fractions having the same denominator,
add only the numerators.

2. Last year John's father spent $\frac{2}{7}$ of his salary for rent, $\frac{2}{7}$ of it for food, and $\frac{1}{7}$ for clothing for the family. What part of his salary was spent altogether for rent, food, and clothing?

3. In a field near Bob's home there are two old hickory trees. On Monday Bob picked up $\frac{1}{8}$ peck of hickory nuts under the trees; on Tuesday, $\frac{3}{8}$ peck; on Wednesday, $\frac{1}{8}$ peck. What part of a peck did Bob pick up on the three days?

Add these fractions. Reduce the answers to lowest terms.

A	B	C	D	E
4. $\frac{1}{3}$ $\frac{1}{3}$ <hr/> $\frac{3}{3}$	$\frac{1}{9}$ $\frac{5}{9}$ <hr/> $\frac{6}{9}$	$\frac{3}{4}$ $\frac{1}{4}$ <hr/> $\frac{4}{4}$	$\frac{1}{6}$ $\frac{1}{6}$ <hr/> $\frac{2}{6}$	$\frac{3}{5}$ $\frac{2}{5}$ <hr/> $\frac{5}{5}$
5. $\frac{2}{5}$ $\frac{2}{5}$ <hr/> $\frac{4}{5}$	$\frac{4}{8}$ $\frac{3}{8}$ <hr/> $\frac{7}{8}$	$\frac{7}{12}$ $\frac{3}{12}$ <hr/> $\frac{10}{12}$	$\frac{1}{10}$ $\frac{7}{10}$ <hr/> $\frac{8}{10}$	$\frac{2}{6}$ $\frac{2}{6}$ <hr/> $\frac{4}{6}$
6. $\frac{5}{16}$ $\frac{7}{16}$ <hr/> $\frac{12}{16}$	$\frac{4}{9}$ $\frac{2}{9}$ <hr/> $\frac{6}{9}$	$\frac{7}{8}$ $\frac{1}{8}$ <hr/> $\frac{8}{8}$	$\frac{4}{15}$ $\frac{2}{15}$ <hr/> $\frac{6}{15}$	$\frac{3}{11}$ $\frac{4}{11}$ <hr/> $\frac{7}{11}$
7. $\frac{3}{20}$ $\frac{7}{20}$ <hr/> $\frac{10}{20}$	$\frac{3}{8}$ $\frac{2}{8}$ <hr/> $\frac{5}{8}$	$\frac{3}{10}$ $\frac{2}{10}$ <hr/> $\frac{5}{10}$	$\frac{4}{9}$ $\frac{4}{9}$ <hr/> $\frac{8}{9}$	$\frac{5}{12}$ $\frac{3}{12}$ <hr/> $\frac{8}{12}$



FRACTIONS WHEN WE MEASURE

1. In one block a truck gardener sold 45 lb., or $\frac{3}{4}$ bu., potatoes to one housewife, and 15 lb., or $\frac{1}{4}$ bu., to another housewife. How many bushels of potatoes did he sell in that block?

The sum of $\frac{3}{4}$ and $\frac{1}{4}$ is $\frac{4}{4}$. The numerator and the denominator are equal. The fraction equals 1.

The gardener sold 1 bu. of potatoes in that block.

2. Last week a dealer sold $\frac{7}{12}$ gross of pencils; the week before he sold $\frac{11}{12}$ gross. How many gross did he sell during the two weeks?

The sum of $\frac{7}{12}$ and $\frac{11}{12}$ is $\frac{18}{12}$. The numerator is larger than the denominator. The fraction equals more than 1 unit. The dealer sold $1\frac{6}{12}$ gross of the pencils. $1\frac{6}{12}$ gross = $1\frac{1}{2}$ gross.

When you get a fraction that has a numerator equal to or larger than the denominator, change the fraction to a whole number or a mixed number by dividing the numerator by the denominator.

34 Adding Fractions with Like Denominators

WHY WE NEED TO ADD FRACTIONS

1. Mr. Harris owns two pieces of land in upper Michigan. One piece of land is 100 square rods, or $\frac{5}{8}$ acre, and the other piece is 140 square rods, or $\frac{7}{8}$ acre. How many acres are in the two pieces?

2. Mr. Griffin owns a restaurant. He served his customers $\frac{7}{8}$ gal. of ice cream on Monday, $\frac{5}{8}$ gal. on Tuesday, and $\frac{7}{8}$ gal. again on Wednesday. How many gallons did he serve on the three days?

3. Last month Carol spent $\frac{1}{4}$ dollar for a toothbrush, $\frac{3}{4}$ dollar for ribbon, and $\frac{3}{4}$ dollar for car fare. How many dollars did she spend in these three ways during the month?

4. John's brother is a helper on part time. Full time where he works is 6 hours a day. One week he was at work $\frac{5}{6}$ day on Monday, all day on Tuesday, and $\frac{5}{6}$ day on Wednesday. How many days' work did he have in that week?

Rapid Exercise in Adding Fractions

Add these fractions. Reduce sums to lowest terms. Write the sums on your paper.

	A	B	C	D	E
5.	$\frac{5}{8}$ $\frac{1}{8}$ $\frac{3}{8}$ <hr/>	$\frac{2}{5}$ $\frac{1}{5}$ $\frac{4}{5}$ <hr/>	$\frac{7}{10}$ $\frac{3}{10}$ $\frac{5}{10}$ <hr/>	$\frac{2}{9}$ $\frac{7}{9}$ $\frac{5}{9}$ <hr/>	$\frac{11}{12}$ $\frac{5}{12}$ $\frac{4}{12}$ <hr/>
6.	$\frac{4}{7}$ $\frac{3}{7}$ <hr/>	$\frac{1}{3}$ $\frac{2}{3}$ <hr/>	$\frac{4}{5}$ $\frac{2}{5}$ <hr/>	$\frac{5}{6}$ $\frac{5}{6}$ <hr/>	$\frac{4}{9}$ $\frac{5}{9}$ <hr/>

BETTER WATCH THESE STEPS

1. On Monday Mrs. Lane bought $\frac{3}{4}$ lb. of bacon; on Wednesday, $\frac{1}{4}$ lb.; on Friday, $\frac{3}{4}$ lb. How much did she pay for all the bacon at 32¢ a pound?

In solving this problem ask yourself:

- (a) What is asked? How much did Mrs. Lane pay for all the bacon?
- (b) What do I know from reading the problem? I know how much bacon Mrs. Lane bought on each day and the price of 1 pound of bacon.
- (c) What must I find first? I must find how much bacon she bought on all three days.

$\begin{array}{r} \frac{3}{4} \\ \frac{1}{4} \\ \frac{3}{4} \\ \hline \frac{7}{4} = 1\frac{3}{4} \end{array}$

- (d) Do I add, subtract, multiply, or divide? I add.
- (e) What must I find next? I must find how much all the bacon cost at 32¢ a pound.

- (f) Do I add, subtract, multiply, or divide? I multiply.

$$1\frac{3}{4} \times 32 = \frac{7}{4} \times \frac{32}{1} = \frac{56}{1} = 56$$

- (g) What shall I call my answer? 56¢.
- (h) Have I answered the question asked? Yes. I have found that Mrs. Lane paid 56¢.
- (i) Does my answer sound reasonable? Yes. One pound cost about $\frac{1}{3}$ dollar and Mrs. Lane bought less than two pounds. She would pay less than $\frac{2}{3}$ dollar for all the bacon.

Subtracting Fractions with Like Denominators



1. Bob gathered walnuts. He found he had $\frac{5}{8}$ of a bushel. He gave $\frac{1}{8}$ bushel to his aunt. What part of a bushel did he have left? $\frac{5}{8} - \frac{1}{8} = ?$

In subtracting fractions having like denominators, subtract only the numerators. Reduce answers to lowest terms.

2. Jane had a piece of ribbon that was $\frac{5}{6}$ yard long. She used $\frac{3}{6}$ yard for a sash for her doll's dress. What part of a yard did she have left?

3. Harold is reading "Tom Sawyer." He had $\frac{7}{8}$ of the book left to read over the week-end. On Friday evening he read $\frac{3}{8}$ of the book. What part of the book does he still have left to read?

Subtract. Reduce answers to lowest terms.

4.	$\frac{7}{12}$ <u>$\frac{4}{12}$</u>	$\frac{9}{16}$ <u>$\frac{3}{16}$</u>	$\frac{8}{9}$ <u>$\frac{5}{9}$</u>	$\frac{9}{14}$ <u>$\frac{3}{14}$</u>	$\frac{11}{20}$ <u>$\frac{5}{20}$</u>
----	--	--	--	--	---

5.	$\frac{15}{16}$ <u>$\frac{5}{16}$</u>	$\frac{11}{15}$ <u>$\frac{7}{15}$</u>	$\frac{19}{20}$ <u>$\frac{5}{20}$</u>	$\frac{13}{14}$ <u>$\frac{6}{14}$</u>	$\frac{7}{9}$ <u>$\frac{4}{9}$</u>
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WHERE BOYS AND GIRLS NEED FRACTIONS

1. Jane's mother used $\frac{1}{2}$ lb. of butter on Monday and $\frac{1}{4}$ lb. on Tuesday. What part of a pound did she use in the two days? $\frac{1}{2} + \frac{1}{4} = ?$

$$\frac{1}{2} = \frac{2}{4}$$

← Change $\frac{1}{2}$ to $\frac{2}{4}$, to make like denominators.

$$\frac{1}{4} = \frac{1}{4}$$

← No change is needed.

$$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$$

← Add.

Jane's mother used $\frac{3}{4}$ lb.

2. On one errand Arthur walked $\frac{5}{8}$ mile and on another errand he walked $\frac{1}{4}$ mile. How far did he walk on the two errands?

3. Elizabeth's mother served $\frac{1}{3}$ of a cake at one meal, $\frac{1}{4}$ of it at another meal, and $\frac{1}{6}$ of it at another meal. What part of the cake did she serve at the three meals? Be sure to reduce your answer to lowest terms.

4. Harry's father has a large apple tree in the yard. Harry picks up the apples that the wind blows off the tree. These are "windfalls." One day Harry picked up $\frac{1}{4}$ bushel of windfalls, the next day $\frac{1}{2}$ bu., and the following day $\frac{1}{8}$ bu. What part of a bushel did he pick up on the three days?

Add these fractions. Be sure to change the answers to lowest terms.

5.

$$\frac{1}{3} + \frac{3}{5}$$

$$\frac{2}{7} + \frac{1}{2}$$

$$\frac{1}{6} + \frac{1}{4}$$

$$\frac{3}{10} + \frac{1}{4}$$

$$\frac{2}{9} + \frac{1}{3}$$

6.

$$\frac{5}{8} + \frac{1}{4}$$

$$\frac{1}{6} + \frac{2}{3}$$

$$\frac{7}{15} + \frac{1}{3}$$

$$\frac{3}{7} + \frac{1}{4}$$

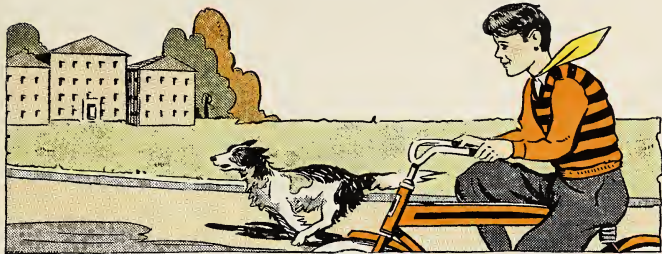
$$\frac{2}{3} + \frac{1}{7}$$

38 How Well Can You Add Whole Numbers?

ANYTHING NEW HERE?

Add down and check by adding up.

- | | | | | | | |
|----|---|---|---|---|---|---|
| 1. | $\begin{array}{r} 4 \\ 7 \\ 5 \\ 1 \\ \hline 9 \end{array}$ | $\begin{array}{r} 8 \\ 9 \\ 3 \\ 5 \\ \hline 9 \end{array}$ | $\begin{array}{r} 3 \\ 9 \\ 6 \\ 0 \\ \hline 2 \end{array}$ | $\begin{array}{r} 7 \\ 9 \\ 4 \\ 8 \\ \hline 6 \end{array}$ | $\begin{array}{r} 6 \\ 5 \\ 3 \\ 1 \\ \hline 5 \end{array}$ | $\begin{array}{r} 9 \\ 5 \\ 8 \\ 9 \\ \hline 6 \end{array}$ |
| 2. | $\begin{array}{r} 5 \\ 3 \\ 7 \\ 7 \\ 5 \\ 4 \\ \hline 2 \end{array}$ | $\begin{array}{r} 8 \\ 5 \\ 4 \\ 6 \\ 7 \\ 3 \\ \hline 8 \end{array}$ | $\begin{array}{r} 6 \\ 2 \\ 3 \\ 8 \\ 4 \\ 9 \\ \hline 7 \end{array}$ | $\begin{array}{r} 6 \\ 8 \\ 4 \\ 2 \\ 8 \\ 9 \\ \hline 7 \end{array}$ | $\begin{array}{r} 3 \\ 6 \\ 0 \\ 9 \\ 4 \\ 6 \\ \hline 2 \end{array}$ | $\begin{array}{r} 7 \\ 5 \\ 4 \\ 8 \\ 4 \\ 8 \\ \hline 7 \end{array}$ |
| 3. | $\begin{array}{r} 583 \\ 487 \\ 974 \\ 605 \\ \hline 169 \end{array}$ | $\begin{array}{r} 728 \\ 478 \\ 287 \\ 603 \\ \hline 369 \end{array}$ | $\begin{array}{r} 476 \\ 874 \\ 962 \\ 490 \\ \hline 639 \end{array}$ | $\begin{array}{r} 465 \\ 349 \\ 408 \\ 539 \\ \hline 956 \end{array}$ | | |
| 4. | $\begin{array}{r} 397 \\ 748 \\ 846 \\ 790 \\ \hline 256 \end{array}$ | $\begin{array}{r} 963 \\ 784 \\ 173 \\ 275 \\ \hline 632 \end{array}$ | $\begin{array}{r} 4276 \\ 1095 \\ \hline 5643 \end{array}$ | $\begin{array}{r} 7506 \\ 8394 \\ \hline 2704 \end{array}$ | | |
| 5. | $\begin{array}{r} 3279 \\ 4156 \\ \hline 3978 \end{array}$ | $\begin{array}{r} 3645 \\ 4897 \\ \hline 5628 \end{array}$ | $\begin{array}{r} 4728 \\ 3549 \\ \hline 2705 \end{array}$ | $\begin{array}{r} 7425 \\ 5018 \\ \hline 6279 \end{array}$ | | |



HENRY RIDES TO SCHOOL

1. Henry lives in the country. When he walks to school, it takes him $\frac{3}{4}$ hour. When he rides his bicycle, it takes him only $\frac{1}{3}$ hour. What fractional part of an hour longer does it take him when he walks than when he rides? $\frac{3}{4} - \frac{1}{3} = ?$

In order to subtract the fractions in this problem. change them to the same denominator.

$$\frac{3}{4} = \frac{9}{12}$$

← Change $\frac{3}{4}$ to $\frac{9}{12}$.

$$\frac{1}{3} = \frac{4}{12}$$

← Change $\frac{1}{3}$ to $\frac{4}{12}$.

$$\frac{5}{12}$$

← Subtract.

It takes Henry $\frac{5}{12}$ hr. longer when he walks.

2. At the beginning of her practice on the typewriter, it took Grace $\frac{1}{2}$ hour to type 1 page. Now she can type a page in $\frac{1}{6}$ hour. How much less time does it take her now to type a page?

3. Carl's baby brother gained $\frac{5}{8}$ lb. this week and $\frac{7}{16}$ lb. last week. How much more did he gain this week than last week?

Subtracting Fractions with Unlike Denominators

Subtract. Change the answers to lowest terms.

	A	B	C	D	E
1.	$\frac{\frac{3}{4}}{\frac{2}{3}}$	$\frac{\frac{5}{6}}{\frac{1}{2}}$	$\frac{\frac{7}{9}}{\frac{2}{3}}$	$\frac{\frac{11}{12}}{\frac{3}{4}}$	$\frac{\frac{11}{14}}{\frac{3}{7}}$
2.	$\frac{\frac{7}{8}}{\frac{1}{2}}$	$\frac{\frac{15}{16}}{\frac{3}{4}}$	$\frac{\frac{3}{4}}{\frac{1}{2}}$	$\frac{\frac{17}{18}}{\frac{2}{3}}$	$\frac{\frac{16}{21}}{\frac{2}{7}}$
3.	$\frac{\frac{7}{10}}{\frac{2}{5}}$	$\frac{\frac{7}{12}}{\frac{1}{4}}$	$\frac{\frac{17}{20}}{\frac{2}{5}}$	$\frac{\frac{5}{8}}{\frac{1}{3}}$	$\frac{\frac{3}{4}}{\frac{3}{5}}$
4.	$\frac{\frac{5}{6}}{\frac{3}{4}}$	$\frac{\frac{9}{14}}{\frac{2}{7}}$	$\frac{\frac{19}{24}}{\frac{3}{8}}$	$\frac{\frac{7}{8}}{\frac{3}{4}}$	$\frac{\frac{11}{12}}{\frac{2}{3}}$
5.	$\frac{\frac{9}{16}}{\frac{1}{8}}$	$\frac{\frac{7}{10}}{\frac{1}{5}}$	$\frac{\frac{9}{14}}{\frac{1}{2}}$	$\frac{\frac{19}{24}}{\frac{1}{8}}$	$\frac{\frac{5}{7}}{\frac{2}{3}}$
6.	$\frac{\frac{5}{6}}{\frac{2}{5}}$	$\frac{\frac{9}{10}}{\frac{2}{3}}$	$\frac{\frac{4}{5}}{\frac{3}{4}}$	$\frac{\frac{5}{8}}{\frac{5}{12}}$	$\frac{\frac{13}{15}}{\frac{2}{3}}$
7.	$\frac{\frac{9}{10}}{\frac{3}{4}}$	$\frac{\frac{3}{4}}{\frac{1}{2}}$	$\frac{\frac{4}{5}}{\frac{1}{2}}$	$\frac{\frac{3}{4}}{\frac{2}{7}}$	$\frac{\frac{3}{9}}{\frac{1}{4}}$
8.	$\frac{\frac{5}{14}}{\frac{2}{7}}$	$\frac{\frac{23}{24}}{\frac{5}{6}}$	$\frac{\frac{2}{3}}{\frac{2}{9}}$	$\frac{\frac{5}{6}}{\frac{2}{3}}$	$\frac{\frac{4}{9}}{\frac{2}{5}}$
9.	$\frac{\frac{3}{4}}{\frac{1}{9}}$	$\frac{\frac{1}{2}}{\frac{1}{5}}$	$\frac{\frac{5}{6}}{\frac{7}{12}}$	$\frac{\frac{9}{14}}{\frac{4}{7}}$	$\frac{\frac{7}{8}}{\frac{7}{12}}$

WHAT IS A TOP-HEAVY FRACTION?

1. Here is a line that is $\frac{4}{4}$ in. long: ' _ _ _ _ '

Here is one $\frac{5}{4}$ in. long: ' _ _ _ _ '

In the fraction $\frac{4}{4}$ the numerator is equal to the denominator. In the fraction $\frac{5}{4}$ the numerator is greater than the denominator.

A fraction in which the numerator is equal to or greater than the denominator is called an improper fraction.

2. Is $\frac{3}{4}$ an improper fraction? No, $\frac{3}{4}$ is a proper fraction, because the numerator is less than the denominator.

Naming Proper and Improper Fractions

At the top of a sheet of paper write the words "Proper" and "Improper." In the exercise below, $\frac{8}{9}$ is a proper fraction. Write $\frac{8}{9}$ on the paper under the word "Proper." The second fraction, $\frac{3}{2}$, is an improper fraction. Write $\frac{3}{2}$ under the word "Improper" on your paper. In the same way tell the kind each fraction is.

- | | | | | |
|--------------------|---------------------|---------------------|---------------------|---------------------|
| 1. $\frac{8}{9}$ | 8. $\frac{4}{7}$ | 15. $\frac{20}{20}$ | 22. $\frac{12}{2}$ | 29. $\frac{7}{10}$ |
| 2. $\frac{3}{2}$ | 9. $\frac{16}{15}$ | 16. $\frac{2}{3}$ | 23. $\frac{16}{21}$ | 30. $\frac{3}{4}$ |
| 3. $\frac{8}{5}$ | 10. $\frac{6}{6}$ | 17. $\frac{7}{4}$ | 24. $\frac{8}{5}$ | 31. $\frac{4}{3}$ |
| 4. $\frac{6}{7}$ | 11. $\frac{5}{2}$ | 18. $\frac{15}{16}$ | 25. $\frac{21}{20}$ | 32. $\frac{3}{8}$ |
| 5. $\frac{7}{6}$ | 12. $\frac{12}{5}$ | 19. $\frac{17}{24}$ | 26. $\frac{5}{9}$ | 33. $\frac{10}{10}$ |
| 6. $\frac{11}{12}$ | 13. $\frac{8}{7}$ | 20. $\frac{3}{10}$ | 27. $\frac{11}{14}$ | 34. $\frac{7}{9}$ |
| 7. $\frac{11}{10}$ | 14. $\frac{17}{20}$ | 21. $\frac{9}{10}$ | 28. $\frac{15}{15}$ | 35. $\frac{13}{18}$ |

TEST YOURSELF

1. Jennie is making new clothes for her doll. She needs $\frac{1}{2}$ yd. of ribbon for a sash and $\frac{3}{8}$ yd. for a hair ribbon. How much ribbon does she need altogether?

2. A dairyman sold $\frac{1}{4}$ gallon of buttermilk to one customer, $\frac{1}{2}$ gallon to another customer, and $\frac{3}{4}$ gallon to a third customer. How much buttermilk did he sell to all three customers?

3. Donald practiced on his violin $\frac{1}{4}$ of an hour before supper and $\frac{2}{3}$ of an hour after supper. What part of an hour did he practice altogether?

Add.

$$4. \quad \begin{array}{r} \frac{1}{7} \\ \frac{1}{7} \\ \hline \end{array} \qquad \begin{array}{r} \frac{5}{8} \\ \frac{5}{8} \\ \hline \end{array} \qquad \begin{array}{r} \frac{5}{9} \\ \frac{6}{9} \\ \hline \end{array} \qquad \begin{array}{r} \frac{1}{10} \\ \frac{7}{10} \\ \hline \end{array} \qquad \begin{array}{r} \frac{2}{3} \\ \frac{1}{3} \\ \hline \end{array}$$

$$5. \quad \begin{array}{r} 4 \\ \frac{1}{2} \\ \hline \end{array} \qquad \begin{array}{r} 5\frac{1}{4} \\ 7 \\ \hline \end{array} \qquad \begin{array}{r} \frac{5}{6} \\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ 4\frac{7}{8} \\ \hline \end{array} \qquad \begin{array}{r} 7\frac{1}{9} \\ \frac{1}{9} \\ \hline \end{array}$$

$$6. \quad \begin{array}{r} \frac{1}{6} \\ 3\frac{1}{6} \\ \hline \end{array} \qquad \begin{array}{r} \frac{1}{2} \\ \frac{1}{8} \\ \hline \end{array} \qquad \begin{array}{r} \frac{3}{4} \\ \frac{5}{12} \\ \hline \end{array} \qquad \begin{array}{r} \frac{1}{2} \\ \frac{1}{10} \\ \hline \end{array} \qquad \begin{array}{r} \frac{2}{3} \\ \frac{1}{12} \\ \hline \end{array}$$

$$7. \quad \begin{array}{r} \frac{1}{10} \\ \frac{4}{5} \\ \frac{1}{10} \\ \hline \end{array} \qquad \begin{array}{r} \frac{1}{5} \\ \frac{1}{3} \\ \hline \end{array} \qquad \begin{array}{r} \frac{1}{4} \\ \frac{1}{6} \\ \frac{1}{4} \\ \hline \end{array} \qquad \begin{array}{r} \frac{1}{5} \\ \frac{1}{3} \\ \frac{7}{15} \\ \hline \end{array} \qquad \begin{array}{r} \frac{4}{7} \\ \frac{1}{2} \\ \hline \end{array}$$

$$8. \quad \begin{array}{r} \frac{1}{4} \\ \frac{3}{5} \\ \frac{7}{10} \\ \hline \end{array} \qquad \begin{array}{r} \frac{5}{24} \\ \frac{2}{3} \\ \frac{1}{4} \\ \hline \end{array} \qquad \begin{array}{r} 7\frac{1}{9} \\ \frac{2}{3} \\ \hline \end{array} \qquad \begin{array}{r} \frac{1}{9} \\ \frac{2}{9} \\ 4\frac{1}{3} \\ \hline \end{array} \qquad \begin{array}{r} \frac{3}{5} \\ \frac{2}{3} \\ \frac{3}{4} \\ \hline \end{array}$$

MAKING USE OF FRACTIONS



1. Richard put on his roller skates and started on an errand for his mother. The entire distance he had to go was $\frac{3}{4}$ mile. When he had skated $\frac{1}{8}$ mile, a strap on one of his skates broke. He had to walk the rest of the distance. How far did Richard have to walk?

2. Helen's mother had $\frac{1}{2}$ bu. of peaches to peel for canning. She peeled $\frac{1}{4}$ bushel, then Helen peeled the rest. What part of a bushel did Helen peel?

3. Jean and Nan are making some tatting for dresser scarfs. Jean has made $\frac{1}{2}$ yard and Nan $\frac{3}{8}$ yard. Which girl has made more? What part of a yard more?

4. Mrs. Clark bought $\frac{2}{3}$ dozen oranges. She used $\frac{1}{4}$ dozen in preparing orange juice for breakfast. What part of a dozen did she have left?

Subtract.

	A	B	C	D	E
5.	$\frac{4}{5}$ $\frac{1}{5}$ —	$8\frac{3}{4}$ $\frac{1}{4}$ —	$\frac{7}{9}$ $\frac{1}{9}$ —	$5\frac{4}{7}$ $\frac{1}{7}$ —	$6\frac{3}{8}$ $\frac{3}{8}$ —
6.	$8\frac{1}{2}$ 3 —	$11\frac{1}{3}$ $\frac{1}{3}$ —	$7\frac{1}{6}$ 7 —	$\frac{5}{12}$ $\frac{1}{3}$ —	$\frac{1}{2}$ $\frac{1}{10}$ —
7.	$\frac{3}{8}$ $\frac{1}{6}$ —	$\frac{7}{16}$ $\frac{1}{4}$ —	$\frac{1}{4}$ $\frac{1}{4}$ —	$\frac{1}{3}$ $\frac{1}{5}$ —	$\frac{5}{6}$ $\frac{3}{4}$ —



EDGAR HELPS ROW THE BOAT

1. Edgar and his parents spent a week-end at Cedar Lake. On Saturday morning they took a ride on the lake in a rowboat. Edgar and his father did the rowing. They rowed $2\frac{7}{8}$ miles. On Sunday afternoon they took another ride, rowing $3\frac{3}{4}$ miles. How far did Edgar and his father row on the two trips? $2\frac{7}{8} + 3\frac{3}{4} = ?$

What is the smallest or least common denominator of $\frac{7}{8}$ and $\frac{3}{4}$?

$$2\frac{7}{8} = 2\frac{7}{8}$$

← No change is needed.

$$3\frac{3}{4} = 3\frac{6}{8}$$

← Change $\frac{3}{4}$ to $\frac{6}{8}$.

$$5\frac{13}{8} = 6\frac{5}{8}$$

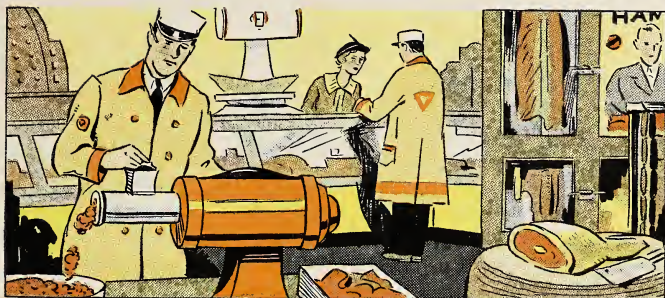
← Add.

They rowed $6\frac{5}{8}$ mi.

2. Every Tuesday and Saturday morning in the summer Mr. Gordon drives to the city market to sell vegetables and fruit. On Tuesday morning of this week he sold $10\frac{1}{2}$ bu. of potatoes; on Saturday morning he sold $16\frac{3}{4}$ bu. How many bushels of potatoes did he sell on the two mornings?

Subtracting Mixed Numbers AT THE MARKET

45



1. A meat dealer ground $16\frac{3}{8}$ lb. of sausage. He sold Mrs. Palmer $2\frac{1}{2}$ lb. of it. How many pounds does he have left? $16\frac{3}{8} - 2\frac{1}{2} = ?$

The least common denominator of 8 and 2 is 8.

$$16\frac{3}{8} = 16\frac{3}{8}$$

← No change is needed.

$$2\frac{1}{2} = 2\frac{4}{8}$$

← Change $\frac{1}{2}$ to $\frac{4}{8}$.

You cannot subtract $\frac{4}{8}$ from $\frac{3}{8}$.

$$16\frac{3}{8}$$

← Add 1 ($\frac{8}{8}$) to $\frac{3}{8}$, making $\frac{11}{8}$.

$$2\frac{4}{8}$$

← Add 1 to 2, making 3

$$\underline{13\frac{7}{8}}$$

← Subtract.

The dealer had $13\frac{7}{8}$ lb. left.

2. On Saturday morning a grocer had on hand $15\frac{1}{4}$ bushels of apples. When he closed his store in the evening, he had sold all but $3\frac{1}{2}$ bushels. How many bushels had he sold during the day?

3. Our grocer bought a barrel of vinegar last week and he has sold $14\frac{3}{4}$ gallons of it. How many gallons does he have left? There are $31\frac{1}{2}$ gallons in a barrel.

46 Adding and Subtracting Mixed Numbers

Add.

	A	B	C	D	E
1.	$\begin{array}{r} 2\frac{3}{4} \\ 8\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 4\frac{3}{7} \\ 6\frac{5}{7} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{7}{12} \\ 5\frac{1}{12} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{1}{2} \\ 10\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 11\frac{3}{5} \\ 14\frac{5}{6} \\ \hline \end{array}$
2.	$\begin{array}{r} 12\frac{1}{6} \\ 9\frac{7}{12} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{2}{5} \\ 4\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 13\frac{5}{6} \\ 7\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 25\frac{4}{5} \\ 16\frac{7}{10} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{1}{7} \\ 3\frac{1}{2} \\ \hline \end{array}$
3.	$\begin{array}{r} 2\frac{3}{8} \\ 1\frac{1}{4} \\ \hline 3\frac{3}{8} \end{array}$	$\begin{array}{r} 5\frac{7}{24} \\ 10\frac{3}{4} \\ \hline 8\frac{5}{6} \end{array}$	$\begin{array}{r} 2\frac{3}{7} \\ 4\frac{3}{4} \\ \hline 8\frac{2}{7} \end{array}$	$\begin{array}{r} 16\frac{3}{10} \\ 4\frac{2}{5} \\ \hline 8\frac{1}{3} \end{array}$	$\begin{array}{r} 18\frac{1}{6} \\ 5\frac{7}{18} \\ \hline 4\frac{1}{9} \end{array}$
4.	$\begin{array}{r} 5\frac{1}{2} \\ 12\frac{2}{3} \\ \hline 6\frac{3}{4} \end{array}$	$\begin{array}{r} 13\frac{3}{10} \\ 24\frac{5}{6} \\ \hline 11\frac{4}{5} \end{array}$	$\begin{array}{r} 27\frac{3}{4} \\ 9\frac{3}{8} \\ \hline 32\frac{5}{16} \end{array}$	$\begin{array}{r} 7\frac{5}{8} \\ 23\frac{3}{4} \\ \hline 10\frac{1}{6} \end{array}$	$\begin{array}{r} 32\frac{1}{2} \\ 19\frac{3}{4} \\ \hline 8\frac{7}{12} \end{array}$

Subtract.

5.	$\begin{array}{r} 6\frac{2}{3} \\ 3\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{5}{6} \\ 4\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{9}{10} \\ 9\frac{3}{10} \\ \hline \end{array}$	$\begin{array}{r} 17\frac{3}{7} \\ 11\frac{5}{7} \\ \hline \end{array}$	$\begin{array}{r} 21\frac{2}{9} \\ 7\frac{4}{9} \\ \hline \end{array}$
6.	$\begin{array}{r} 13\frac{1}{4} \\ 7\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 23\frac{1}{3} \\ 23\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 15\frac{1}{8} \\ 9\frac{5}{8} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{3}{4} \\ 2\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 27\frac{2}{3} \\ 18\frac{1}{15} \\ \hline \end{array}$
7.	$\begin{array}{r} 8\frac{5}{7} \\ 4\frac{2}{3} \\ \hline \end{array}$	$\begin{array}{r} 22\frac{2}{4} \\ 15\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 19\frac{5}{6} \\ 19\frac{3}{5} \\ \hline \end{array}$	$\begin{array}{r} 10\frac{1}{2} \\ 6\frac{1}{5} \\ \hline \end{array}$	$\begin{array}{r} 32\frac{3}{8} \\ 15\frac{2}{3} \\ \hline \end{array}$
8.	$\begin{array}{r} 14\frac{3}{10} \\ 8\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 35\frac{1}{6} \\ 23\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 57\frac{1}{14} \\ 39\frac{3}{7} \\ \hline \end{array}$	$\begin{array}{r} 21\frac{7}{15} \\ 21\frac{7}{15} \\ \hline \end{array}$	$\begin{array}{r} 42\frac{2}{5} \\ 27\frac{5}{6} \\ \hline \end{array}$

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples in this test. If you make mistakes in any row, she will have you do others of the same kind on the next page. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her.

Addition

$$1. \quad \begin{array}{r} \frac{1}{7} \\ \frac{1}{7} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{12} \\ \frac{5}{12} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{4} \\ \frac{1}{4} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{11} \\ \frac{5}{11} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{8} \\ \frac{5}{8} \\ \hline \end{array}$$

$$2. \quad \begin{array}{r} 6 \\ \frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} 10 \\ 2\frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} 7\frac{1}{9} \\ \frac{1}{9} \\ \hline \end{array} \quad \begin{array}{r} 3\frac{1}{6} \\ 8\frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} 13\frac{3}{4} \\ 3\frac{3}{4} \\ \hline \end{array}$$

$$3. \quad \begin{array}{r} \frac{1}{3} \\ \frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{3} \\ \frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} \frac{4}{5} \\ \frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{10} \\ \frac{1}{2} \\ \frac{1}{5} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{3} \\ \frac{1}{7} \\ \hline \end{array}$$

$$4. \quad \begin{array}{r} 8\frac{5}{12} \\ 4\frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} 12\frac{5}{8} \\ 6\frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} 9\frac{7}{24} \\ 3\frac{3}{8} \\ \hline \end{array} \quad \begin{array}{r} 9\frac{1}{2} \\ 4\frac{1}{9} \\ \hline \end{array} \quad \begin{array}{r} 14\frac{4}{5} \\ 8\frac{7}{10} \\ \hline \end{array}$$

$$5. \quad \begin{array}{r} \frac{1}{8} \\ 3\frac{1}{2} \\ \frac{1}{8} \\ \hline \end{array} \quad \begin{array}{r} 11\frac{1}{8} \\ 5\frac{1}{3} \\ 13\frac{1}{8} \\ \hline \end{array} \quad \begin{array}{r} 18\frac{1}{2} \\ 9\frac{3}{7} \\ \frac{1}{14} \\ \hline \end{array} \quad \begin{array}{r} 8\frac{3}{4} \\ 5\frac{7}{8} \\ 7\frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} 14\frac{1}{4} \\ 6\frac{17}{20} \\ 22\frac{3}{5} \\ \hline \end{array}$$

Remedial Exercises in Addition of Fractions

CURING OUR WEAK SPOTS

If you made mistakes in any row in the test on page 47, do the row of the same number on this page.

Addition

1.	$\frac{1}{5}$ $\frac{1}{5}$ <hr/>	$\frac{3}{8}$ $\frac{1}{8}$ <hr/>	$\frac{2}{3}$ $\frac{1}{3}$ <hr/>	$\frac{3}{7}$ $\frac{5}{7}$ <hr/>	$\frac{9}{10}$ $\frac{3}{10}$ <hr/>
----	---	---	---	---	---

2.	5 $\frac{1}{3}$ <hr/>	3 $2\frac{5}{8}$ <hr/>	5 $\frac{1}{7}$ <hr/>	3 $\frac{1}{4}$ <hr/>	11 $\frac{2}{3}$ <hr/>
----	-----------------------------	------------------------------	-----------------------------	-----------------------------	------------------------------

3.	$\frac{1}{10}$ $\frac{1}{5}$ <hr/>	$\frac{1}{12}$ $\frac{1}{4}$ <hr/>	$\frac{2}{3}$ $\frac{3}{4}$ <hr/>	$\frac{5}{8}$ $\frac{3}{4}$ $\frac{1}{2}$ <hr/>	$\frac{1}{10}$ $\frac{1}{3}$ <hr/>
----	--	--	---	--	--

4.	6 $\frac{5}{8}$ $3\frac{1}{4}$ <hr/>	4 $\frac{3}{10}$ $2\frac{1}{5}$ <hr/>	8 $\frac{7}{8}$ $1\frac{1}{4}$ <hr/>	5 $\frac{5}{12}$ $2\frac{3}{4}$ <hr/>	9 $\frac{1}{4}$ $1\frac{1}{7}$ <hr/>
----	---	--	---	--	---

5.	$\frac{1}{5}$ 4 $\frac{1}{2}$ $\frac{3}{10}$ <hr/>	$\frac{1}{3}$ 7 $\frac{1}{4}$ $5\frac{1}{6}$ <hr/>	$\frac{9}{8}$ 16 $\frac{3}{4}$ $\frac{1}{8}$ <hr/>	$\frac{1}{2}$ 12 $\frac{9}{20}$ $4\frac{1}{5}$ <hr/>	$\frac{1}{5}$ 2 $\frac{3}{5}$ $4\frac{2}{3}$ <hr/>
----	--	--	--	--	--

6.	$\frac{2}{7}$ $\frac{8}{14}$ $\frac{1}{4}$ <hr/>	$\frac{1}{2}$ 11 $\frac{4}{6}$ $\frac{2}{3}$ <hr/>	$\frac{3}{4}$ $\frac{5}{12}$ 6 $\frac{1}{2}$ <hr/>	$\frac{8}{9}$ 4 $\frac{1}{3}$ $3\frac{3}{8}$ <hr/>	$\frac{2}{3}$ 1 $\frac{1}{2}$ 9 $\frac{1}{4}$ <hr/>
----	---	--	--	--	--

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples on this page. If you make mistakes in any row, she will have you do others of the same kind on the next page. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her.

Subtraction

- | | | | | |
|------------------------------------|------------------------------------|----------------------------------|----------------------------------|---------------------------------|
| 1. $\frac{7}{9} - \frac{2}{9}$ | 8 $\frac{7}{8} - \frac{1}{8}$ | 11 $\frac{1}{2} - \frac{1}{2}$ | 5 $\frac{2}{3} - \frac{2}{3}$ | 7 $\frac{3}{7} - \frac{1}{7}$ |
| 2. $4\frac{1}{10} - 2$ | 9 $\frac{5}{14} - \frac{3}{14}$ | 7 $\frac{1}{5} - 7$ | 6 $\frac{2}{3} - \frac{1}{3}$ | 9 $\frac{4}{5} - \frac{4}{5}$ |
| 3. $3 - \frac{1}{3}$ | 7 $\frac{1}{4}$ | 1 $\frac{1}{6} - \frac{5}{6}$ | 12 $4\frac{3}{7}$ | 8 $4\frac{5}{8}$ |
| 4. $7\frac{1}{10} - 4\frac{3}{10}$ | 11 $\frac{4}{15} - 10\frac{8}{15}$ | 5 $\frac{1}{7} - 2\frac{5}{7}$ | 8 $\frac{5}{12} - \frac{7}{12}$ | 7 $\frac{1}{11} - \frac{5}{11}$ |
| 5. $\frac{1}{3} - \frac{1}{5}$ | 4 $\frac{2}{3} - \frac{1}{9}$ | $\frac{1}{2} - \frac{1}{14}$ | 12 $\frac{1}{4} - 12\frac{1}{8}$ | 13 $\frac{7}{10} - \frac{1}{2}$ |
| 6. $8\frac{2}{5} - \frac{13}{20}$ | 5 $\frac{1}{4} - \frac{5}{12}$ | 11 $\frac{3}{4} - 2\frac{1}{12}$ | 3 $\frac{1}{8} - 2\frac{3}{8}$ | 6 $\frac{5}{9} - \frac{1}{18}$ |
| 7. $1\frac{1}{8} - \frac{2}{3}$ | 8 $\frac{5}{7} - 8\frac{5}{7}$ | 7 $\frac{2}{3} - \frac{4}{5}$ | 10 $\frac{1}{7} - \frac{1}{3}$ | $\frac{1}{4} - \frac{1}{4}$ |

CURING OUR WEAK SPOTS

Use these examples after the test on page 49.

Subtraction

$$\begin{array}{r} 1. \quad \frac{7}{8} \\ \frac{3}{8} \\ \hline \end{array} \quad \begin{array}{r} 6 \frac{5}{6} \\ \frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{9} \\ \frac{1}{9} \\ \hline \end{array} \quad \begin{array}{r} 2 \frac{3}{4} \\ \frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} 5 \frac{5}{7} \\ \frac{1}{7} \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 2 \frac{1}{5} \\ 1 \\ \hline \end{array} \quad \begin{array}{r} 3 \frac{7}{12} \\ 2 \frac{1}{12} \\ \hline \end{array} \quad \begin{array}{r} 8 \frac{1}{4} \\ 8 \\ \hline \end{array} \quad \begin{array}{r} 5 \frac{3}{4} \\ 2 \frac{1}{4} \\ \hline \end{array} \quad \begin{array}{r} 8 \frac{5}{8} \\ 1 \frac{5}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 4 \\ \frac{1}{5} \\ \hline \end{array} \quad \begin{array}{r} 5 \\ \frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} 1 \frac{1}{5} \\ \frac{4}{5} \\ \hline \end{array} \quad \begin{array}{r} 16 \\ 2 \frac{3}{8} \\ \hline \end{array} \quad \begin{array}{r} 10 \\ 3 \frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 3 \frac{1}{8} \\ 1 \frac{3}{8} \\ \hline \end{array} \quad \begin{array}{r} 11 \frac{1}{3} \\ 10 \frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} 4 \frac{1}{8} \\ 2 \frac{5}{8} \\ \hline \end{array} \quad \begin{array}{r} 6 \frac{2}{5} \\ \frac{4}{5} \\ \hline \end{array} \quad \begin{array}{r} 5 \frac{1}{4} \\ \frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad \frac{1}{3} \\ \frac{1}{4} \\ \hline \end{array} \quad \begin{array}{r} 2 \frac{1}{2} \\ \frac{1}{8} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{4} \\ \frac{1}{10} \\ \hline \end{array} \quad \begin{array}{r} 10 \frac{1}{2} \\ 10 \frac{1}{4} \\ \hline \end{array} \quad \begin{array}{r} 15 \frac{3}{8} \\ \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 6 \frac{1}{5} \\ \frac{7}{10} \\ \hline \end{array} \quad \begin{array}{r} 3 \frac{1}{3} \\ \frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} 9 \frac{2}{3} \\ 3 \frac{1}{8} \\ \hline \end{array} \quad \begin{array}{r} 6 \frac{3}{4} \\ \frac{1}{8} \\ \hline \end{array} \quad \begin{array}{r} 5 \frac{1}{4} \\ \frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 1 \frac{1}{5} \\ \frac{3}{10} \\ \hline \end{array} \quad \begin{array}{r} 7 \frac{5}{8} \\ 7 \frac{5}{8} \\ \hline \end{array} \quad \begin{array}{r} 6 \frac{1}{5} \\ \frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} 10 \frac{1}{5} \\ \frac{1}{4} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{8} \\ \frac{1}{8} \\ \hline \end{array}$$

WINNERS' PAGE

For pupils who made no mistakes on pages
47 and 49.

1. Dorothy says that her sister Betty Ann, the baby, gained $\frac{7}{16}$ lb. in the first week of January, $\frac{5}{16}$ lb. the second week, $\frac{9}{16}$ lb. the third week, and $\frac{3}{16}$ lb. the fourth week. How many pounds did Betty Ann gain during the four weeks?

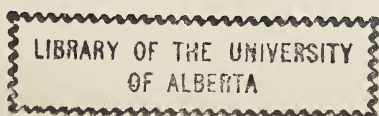
2. This year Mr. Black's farm yielded him an average of $64\frac{3}{4}$ bu. of corn an acre. Last year the average was $59\frac{7}{8}$ bu. an acre. How much more was the average for each acre this year than last year?

3. On a business trip in his automobile Mr. Reed averaged $15\frac{3}{10}$ miles on a gallon of gasoline. His brother, in making the same trip in a different car, averaged $13\frac{7}{10}$ miles a gallon of gasoline. How much better was the average made by Mr. Reed than the average made by his brother?

4. Bob has to find out how many feet of wire fencing will be needed for their garden plot which is $22\frac{1}{2}$ feet long and $17\frac{3}{4}$ feet wide. How many feet of wire fencing should Bob find that it will take?

5. Irene's mother needs $18\frac{3}{4}$ yd. of curtain material for the living room, $14\frac{5}{8}$ yd. for the dining room, $12\frac{1}{2}$ yd. for the library, and $35\frac{1}{4}$ yd. for the bedrooms. How many yards does she need altogether?

6. The average weight of the players on the Tate school team is $155\frac{3}{4}$ lb. and of the players on the Cobb team, $162\frac{5}{8}$ lb. How much more is the average weight of each person on the Cobb team than that of each person on the Tate team?



FINDING HOW WELL YOU CAN SOLVE PROBLEMS

Time, 18 minutes. Your score will be the number of problems you solve correctly in the time that is allowed.

1. Mrs. Gray bought 320 tulip bulbs. In the spring 304 of the bulbs blossomed and the rest did not. What part of all these bulbs had blossoms?

2. One day Miss Alger had 48 letters to type. By noon she had typed 30 of them. What part of all the letters had she typed?

3. Mr. Brown sells greeting cards. On Monday he sold $27\frac{2}{3}$ dozen cards, the next day $22\frac{1}{2}$ dozen, and on Wednesday $46\frac{5}{6}$ dozen. How many dozen cards did he sell in the three days?

4. This week Mr. Burton sold $48\frac{1}{2}$ dozen eggs at the city market. Last week he sold $39\frac{3}{4}$ dozen. How many more dozen did he sell this week than last week?

5. For five days the daily sales of ice cream at Cramer's were: Monday, $27\frac{1}{2}$ gallons; Tuesday, $15\frac{3}{4}$ gallons; Wednesday, $24\frac{7}{8}$ gallons; Thursday, $35\frac{1}{2}$ gallons; and Friday, $16\frac{1}{4}$ gallons. How many gallons of ice cream did Cramer's sell in the five days?

6. After school, Harry helps his father on the farm. Last Monday he dug $\frac{3}{4}$ bu. potatoes; Thursday, $\frac{1}{4}$ bu.; and Friday, $\frac{3}{4}$ bu. At the market on Saturday his father sold these potatoes and $9\frac{3}{4}$ bu. more. How many potatoes did his father sell?

DAN AS A GARDENER

1. Dan's father planted a patch of potatoes. There were 27 rows of potatoes. One morning Dan started to weed and hoe the patch. His father thought he ought to do $\frac{4}{5}$ of the work by noon. How many rows would that be? $\frac{4}{5} \times 27 = ?$

To multiply a whole number by a fraction, multiply the whole number by the numerator of the fraction and then divide the product by the denominator of the fraction.

2. Mr. and Mrs. Holland planned the following yearly budget for the family income which was \$3500: Food $\frac{1}{4}$, rent $\frac{1}{5}$, household running expense $\frac{3}{20}$, clothes $\frac{1}{4}$, recreation $\frac{1}{20}$, savings and insurance $\frac{1}{10}$. Find the amount of money allowed for each item.

3. The sixth grade pupils in the Phillips school had a candy sale. Their total sales amounted to \$7.20. They voted to use $\frac{3}{4}$ of the money to buy Christmas toys for some children who were ill. How much money did they use for the toys?

4. Find the down payment on each of these cars:

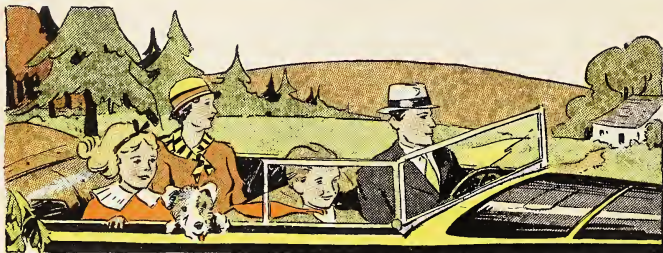
Used Cars: $\frac{1}{4}$ down and 12 payments

Ford	\$375	Packard	\$1675
Chevrolet	428	Buick	1180
Studebaker	725	Nash	679

5. $\frac{2}{5} \times 42 =$ $\frac{2}{3} \times 10 =$ $\frac{3}{8} \times 17 =$ $\frac{3}{5} \times 22 =$

6. $\frac{1}{8} \times 83 =$ $\frac{5}{8} \times 21 =$ $\frac{4}{9} \times 16 =$ $\frac{4}{7} \times 16 =$

7. $\frac{3}{4} \times 21 =$ $\frac{1}{7} \times 78 =$ $\frac{3}{11} \times 13 =$ $\frac{7}{8} \times 25 =$



OUT ON THE OPEN ROAD

1. Mr. and Mrs. Scott and their two children, Robert and Dorothy, took an auto trip of 1420 miles. On the first day they traveled $\frac{1}{5}$ of the entire distance. How many miles did they travel that day?

2. On the second day they covered $\frac{1}{4}$ of the remaining distance. How many miles did they cover the second day?

3. On the third day they traveled $\frac{1}{6}$ of the remaining distance. How many miles did they travel that day?

4. On the fourth day they had engine trouble and were able to cover only $\frac{1}{10}$ of the distance that was left. How far did they travel the fourth day?

5. They traveled $\frac{1}{3}$ of the remaining distance on the fifth day. How many miles did they travel on the fifth day?

6. One-half of the remaining distance was covered on the sixth day. How many miles did they cover the sixth day?

7. How many miles were left to finish the trip?

$$8. \frac{9}{10} \text{ of } 17 = \quad \frac{4}{7} \times 27 = \quad \frac{3}{10} \times 11 = \quad \frac{4}{5} \times 17 =$$

$$9. \frac{5}{6} \text{ of } 5 = \quad \frac{5}{12} \times 7 = \quad \frac{2}{7} \times 24 = \quad \frac{2}{3} \times 8 =$$

THESE PEOPLE USE FRACTIONS

1. One morning a milk dealer delivered $\frac{1}{2}$ pt. of coffee cream to each of 13 customers. How many pints of coffee cream did he deliver to all 13 customers? $13 \times \frac{1}{2} = ?$

To multiply a fraction by a whole number, multiply the numerator of the fraction by the whole number and then divide the product by the denominator of the fraction.

2. During the same morning he delivered $\frac{1}{2}$ pt. of whipping cream to each of 16 customers. How many pints of whipping cream did he deliver to all 16 customers?

3. Joan is making walnut candy. The recipe calls for $\frac{3}{4}$ cup of milk. She is making a double recipe. How much milk will she need?

4. The same recipe calls for $\frac{2}{3}$ cup of walnuts. How many cups of walnuts will she need for a double recipe?

5. Jack's father is a watchman at a railroad crossing. Each noon and each evening Jack carries his father's meal to him. The distance Jack walks from home to the railroad crossing is $\frac{3}{8}$ mile. How far does Jack walk each day in making the trips to and from the railroad crossing?

Multiply.

6. $28 \times \frac{1}{3} =$ $16 \times \frac{4}{9} =$ $23 \times \frac{5}{8} =$ $17 \times \frac{2}{3} =$

7. $32 \times \frac{1}{5} =$ $21 \times \frac{3}{10} =$ $14 \times \frac{3}{5} =$ $33 \times \frac{2}{7} =$

8. $56 \times \frac{2}{3} =$ $25 \times \frac{2}{3} =$ $11 \times \frac{5}{7} =$ $15 \times \frac{3}{8} =$



HOW FAR DO THEY WALK?

1. Some of the boys in the sixth grade have found out what part of a mile they live from the school. They want to find how many miles each boy walks in going to and from school twice a day in one school month of 20 days. Each boy makes 80 trips in a month. How many miles does each of these boys walk in making the 80 trips?

Boy	Distance from Home to School
Ralph	$\frac{2}{3}$ mile
John	$\frac{3}{4}$ mile
Henry	$\frac{7}{8}$ mile
Floyd	$\frac{9}{10}$ mile
Nelson	$\frac{4}{5}$ mile
Clarence	$\frac{5}{6}$ mile
Thomas	$\frac{1}{3}$ mile
Paul	$\frac{7}{10}$ mile
Robert	$\frac{5}{8}$ mile
George	$\frac{2}{5}$ mile
Frederick	$\frac{1}{4}$ mile
William	$\frac{3}{5}$ mile

ORANGE JUICE FOR BREAKFAST



1. Mrs. Walsh is preparing orange juice for the family's breakfast. She has 10 oranges, or $\frac{5}{6}$ dozen, on hand. She uses $\frac{1}{2}$ of the oranges in preparing the juice. What part of a dozen does she use? $\frac{1}{2} \times \frac{5}{6} = ?$

2. Ann found $\frac{3}{4}$ yard of blue silk in one of the boxes up in the attic. Her mother said that she might have it for making doll dresses. She made two dresses, using $\frac{1}{2}$ of the silk for each dress. What part of a yard did it take for each dress?

3. Jack's home is $\frac{3}{8}$ of a mile from the junior high school that he attends. His sister, who goes to an elementary school, each day walks with him $\frac{2}{3}$ of the distance that he has to go. What part of a mile does she walk with Jack?

To multiply two fractions, first multiply the numerators and then multiply the denominators. The product of the numerators will be the numerator in the answer, and the product of the denominators will be the denominator.

- | | | | |
|--|------------------------------------|------------------------------------|------------------------------------|
| 4. $\frac{1}{2} \times \frac{1}{10} =$ | $\frac{2}{3} \times \frac{2}{5} =$ | $\frac{1}{3} \times \frac{5}{8} =$ | $\frac{1}{3}$ of $\frac{1}{7} =$ |
| 5. $\frac{1}{5} \times \frac{3}{4} =$ | $\frac{1}{2} \times \frac{1}{6} =$ | $\frac{1}{5}$ of $\frac{2}{3} =$ | $\frac{3}{4} \times \frac{3}{5} =$ |
| 6. $\frac{3}{7} \times \frac{2}{5} =$ | $\frac{3}{4} \times \frac{1}{2} =$ | $\frac{1}{2}$ of $\frac{1}{7} =$ | $\frac{1}{2}$ of $\frac{7}{8} =$ |
| 7. $\frac{2}{9} \times \frac{2}{3} =$ | $\frac{1}{8} \times \frac{1}{3} =$ | $\frac{5}{6} \times \frac{1}{2} =$ | $\frac{1}{4} \times \frac{1}{4} =$ |
| 8. $\frac{3}{8} \times \frac{1}{2} =$ | $\frac{1}{5} \times \frac{1}{2} =$ | $\frac{1}{2}$ of $\frac{4}{5} =$ | $\frac{1}{3} \times \frac{1}{6} =$ |

NOTHING NEW HERE

Multiply.

- | | | | | |
|-----|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 1. | $\frac{5}{6}$ of 61 = | $\frac{5}{12} \times 11 =$ | $\frac{1}{6}$ of 25 = | $\frac{5}{12} \times 7 =$ |
| 2. | $\frac{7}{10} \times 13 =$ | $\frac{4}{5} \times 16 =$ | $\frac{3}{10} \times 9 =$ | $\frac{1}{4} \times 23 =$ |
| 3. | $\frac{3}{4} \times 13 =$ | $\frac{5}{6}$ of 31 = | $\frac{3}{8}$ of 13 = | $\frac{5}{12} \times 17 =$ |
| 4. | $\frac{2}{9} \times 17 =$ | $\frac{4}{5} \times 27 =$ | $\frac{2}{5} \times 12 =$ | $\frac{3}{4} \times 11 =$ |
| 5. | $\frac{2}{3} \times 11 =$ | $\frac{7}{8} \times 18 =$ | $\frac{5}{6} \times 7 =$ | $\frac{7}{8} \times 9 =$ |
| 6. | $11 \times \frac{3}{4} =$ | $36 \times \frac{3}{5} =$ | $27 \times \frac{1}{4} =$ | $22 \times \frac{4}{9} =$ |
| 7. | $13 \times \frac{5}{12} =$ | $19 \times \frac{2}{3} =$ | $12 \times \frac{1}{7} =$ | $34 \times \frac{3}{7} =$ |
| 8. | $\frac{1}{3}$ of $\frac{1}{12} =$ | $\frac{2}{3} \times \frac{1}{5} =$ | $\frac{2}{3} \times \frac{2}{3} =$ | $\frac{2}{5} \times \frac{1}{4} =$ |
| 9. | $\frac{5}{8} \times \frac{1}{3} =$ | $\frac{1}{4} \times \frac{3}{4} =$ | $\frac{1}{2}$ of $\frac{1}{9} =$ | $\frac{1}{4} \times \frac{1}{3} =$ |
| 10. | $\frac{1}{2}$ of $\frac{3}{5} =$ | $\frac{1}{2}$ of $\frac{1}{8} =$ | $\frac{2}{3} \times \frac{4}{5} =$ | $\frac{4}{5} \times \frac{4}{5} =$ |

Add.

- | | | | | |
|-----|--|---|--|---|
| 11. | $\begin{array}{r} 24\frac{2}{9} \\ 16\frac{1}{2} \\ 32\frac{2}{3} \\ \hline \end{array}$ | $\begin{array}{r} 17\frac{5}{8} \\ 8\frac{5}{6} \\ \hline \end{array}$ | $\begin{array}{r} 16\frac{2}{15} \\ 7\frac{3}{5} \\ 11\frac{2}{3} \\ \hline \end{array}$ | $\begin{array}{r} 42\frac{2}{7} \\ 14\frac{3}{4} \\ \hline \end{array}$ |
| 12. | $\begin{array}{r} 12\frac{1}{6} \\ 9\frac{1}{3} \\ 15\frac{5}{12} \\ \hline \end{array}$ | $\begin{array}{r} 18\frac{1}{2} \\ 21\frac{4}{5} \\ \hline \end{array}$ | $\begin{array}{r} 11\frac{1}{9} \\ 13\frac{5}{6} \\ 6\frac{2}{3} \\ \hline \end{array}$ | $\begin{array}{r} 7\frac{4}{7} \\ 20\frac{1}{3} \\ \hline \end{array}$ |

DO YOU REMEMBER THIS SHORT CUT?

1. In the fall Mrs. Jones bought $\frac{3}{4}$ dozen rose plants. The next spring $\frac{2}{3}$ of them bloomed. What part of a dozen rose plants did she have in blossom?

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$$

There is a shorter way to work this problem. The shorter way is called **cancellation**. Do you remember how to cancel? Cancellation means dividing one numerator and one denominator by the same number. In this problem you can cancel twice.

$$\begin{array}{cc} 1 & 1 \\ \cancel{2} & \cancel{3} \\ \cancel{3} & \cancel{4} \\ 1 & 2 \end{array} \times = \frac{1}{2}$$

Divide 2 and 4 each by 2.

Divide 3 and 3 each by 3.

Then $1 \times 1 = 1$

and $1 \times 2 = 2$.

2. James went to his uncle's farm to spend the summer. His uncle gave him $\frac{5}{8}$ acre to plant in vegetables. He used about $\frac{2}{5}$ of it for beans. About what part of an acre did he plant in beans?

3. With the money that Lucy earned taking care of a neighbor's baby, she bought $\frac{3}{4}$ of a pound of candy. She gave $\frac{1}{3}$ of it to her sister. What part of a pound did her sister get?

Multiply. Cancel if possible.

$$4. \frac{5}{6} \times \frac{3}{5} =$$

$$5. \frac{7}{8} \times \frac{4}{7} =$$

$$6. \frac{3}{4} \times \frac{5}{9} =$$

$$7. \frac{6}{7} \times \frac{2}{3} =$$

$$8. \frac{4}{5} \times \frac{15}{16} =$$

$$9. \frac{1}{2} \times \frac{10}{11} =$$

$$\frac{3}{7} \times \frac{1}{3} =$$

$$\frac{2}{9} \times \frac{3}{4} =$$

$$\frac{3}{10} \times \frac{5}{6} =$$

$$\frac{5}{16} \times \frac{4}{5} =$$

$$\frac{7}{12} \times \frac{9}{14} =$$

$$\frac{3}{21} \times \frac{7}{9} =$$

$$\frac{2}{3} \times \frac{3}{10} \times \frac{5}{6} =$$

$$\frac{8}{9} \times \frac{1}{2} \times \frac{3}{16} =$$

$$\frac{7}{8} \times \frac{3}{10} \times \frac{5}{14} =$$

$$\frac{4}{5} \times \frac{2}{3} \times \frac{5}{12} =$$

$$\frac{3}{4} \times \frac{5}{6} \times \frac{1}{10} =$$

$$\frac{4}{15} \times \frac{3}{4} \times \frac{2}{3} =$$

60 Reducing Mixed Numbers to Improper Fractions

JOHN'S MONEY

1. John says that he has $4\frac{1}{2}$ dollars in his bank. If he changed all his money to half-dollars, how many pieces of money would he have? $4\frac{1}{2} = \frac{?}{2}$.

Can you see, without using a pencil, that there are 9 half-dollars in $4\frac{1}{2}$ dollars?

Now let us see what we get when we use a pencil.

$4\frac{1}{2} = \frac{9}{2}$	$2 \times 4 = 8$	← The number of halves in 4
	$8 + 1 = 9$	← The number of halves in $4\frac{1}{2}$

There are $\frac{9}{2}$ in $4\frac{1}{2}$.

To reduce a mixed number to an improper fraction, multiply the whole number by the denominator and add the numerator to this product. Write the sum over the denominator.

Change each mixed number to an improper fraction. This will help you to do the work on the next page.

2. $2\frac{1}{7}$	$9\frac{3}{7}$	$9\frac{2}{5}$	$10\frac{1}{2}$	$8\frac{1}{3}$
3. $4\frac{5}{8}$	$6\frac{7}{8}$	$2\frac{5}{12}$	$5\frac{1}{2}$	$4\frac{1}{11}$
4. $3\frac{2}{3}$	$6\frac{3}{5}$	$7\frac{3}{4}$	$7\frac{2}{3}$	$5\frac{4}{5}$
5. $9\frac{5}{6}$	$7\frac{1}{2}$	$3\frac{1}{15}$	$8\frac{1}{10}$	$5\frac{3}{10}$
6. $6\frac{1}{4}$	$8\frac{5}{9}$	$5\frac{4}{9}$	$3\frac{1}{5}$	$9\frac{1}{4}$

Change these larger mixed numbers to improper fractions.

7. $42\frac{1}{2}$	$16\frac{3}{4}$	$25\frac{1}{5}$	$18\frac{4}{5}$	$29\frac{1}{12}$
8. $55\frac{2}{3}$	$14\frac{3}{10}$	$72\frac{1}{9}$	$48\frac{3}{7}$	$28\frac{3}{8}$

PILING WOOD



1. Jim's father bought $2\frac{1}{2}$ cords of wood which was placed in the basement. Jim promised to arrange the wood in neat piles. He began work on Saturday morning after breakfast. By noon he had stacked $\frac{1}{2}$ of the wood. How many cords had he stacked? $\frac{1}{2} \times 2\frac{1}{2} = ?$

Change the mixed number to an improper fraction.

$$2\frac{1}{2} = \frac{5}{2}$$

← Change the mixed number.

$$\frac{1}{2} \times \frac{5}{2} = \frac{5}{4} = 1\frac{1}{4}$$

← Multiply.

Jim had stacked $1\frac{1}{4}$ cords of wood by noon.

To multiply a mixed number by a fraction, first change the mixed number to an improper fraction.

2. Helen is trying to memorize a piece of music. The piece is $3\frac{1}{2}$ pages long. She has memorized $\frac{1}{2}$ of it. How many pages has she memorized?

3. Jane wishes to make fudge. Her mother tells her that the full recipe makes $1\frac{1}{4}$ lb. Jane decides to make $\frac{1}{2}$ of a recipe. What part of a pound of fudge will she have?

Multiply. Cancel, if possible.

$$4. \quad \frac{1}{3} \times 2\frac{1}{4} =$$

$$\frac{5}{6} \times 2\frac{1}{10} =$$

$$\frac{1}{2} \times 2\frac{1}{8} =$$

$$5. \quad \frac{2}{5} \times 4\frac{1}{2} =$$

$$\frac{3}{11} \times 4\frac{8}{9} =$$

$$\frac{4}{5} \times 2\frac{2}{9} =$$



ALICE'S VACATION

1. Alice and her parents went to Pleasant Lake for one week. On the morning of the first day she spent $2\frac{1}{2}$ hours in swimming, playing tennis, and reading. She spent $\frac{1}{5}$ of that time swimming, $\frac{2}{5}$ of it playing tennis, and the other $\frac{2}{5}$ of it reading. What part of an hour did she use for each activity?

2. In the afternoon she used $1\frac{3}{4}$ hours hiking and reading. She hiked $\frac{2}{3}$ of the time and read $\frac{1}{3}$. How much time did she spend in hiking? In reading?

3. Here is her record for the second day:

Morning ($1\frac{1}{2}$ hr.)

$\frac{3}{5}$ of the time rowing $\frac{2}{5}$ of the time reading

Afternoon ($2\frac{1}{4}$ hr.)

$\frac{2}{3}$ of the time playing croquet

$\frac{1}{3}$ of the time swimming

How much time did she spend in each activity?

Multiplying a Mixed Number by a Mixed Number 63

BOB AND HENRY GO HIKING



1. It is Saturday morning. Bob and Henry have gone on a hike. They average $2\frac{3}{4}$ miles each hour. They hike $2\frac{1}{2}$ hours before they stop for lunch. How far have they hiked before they stop for lunch?
 $2\frac{1}{2} \times 2\frac{3}{4} = ?$

$$2\frac{1}{2} = \frac{5}{2}$$

$$2\frac{3}{4} = \frac{11}{4}$$

$$\frac{5}{2} \times \frac{11}{4} = \frac{55}{8} = 6\frac{7}{8}$$

← Change $2\frac{1}{2}$ to $\frac{5}{2}$.

← Change $2\frac{3}{4}$ to $\frac{11}{4}$.

← Multiply. Cancel, if possible.

The boys hiked $6\frac{7}{8}$ miles.

To multiply a mixed number by a mixed number, first change each mixed number to an improper fraction.

Multiply.

$$2. \quad 1\frac{1}{2} \times 3\frac{1}{8} =$$

$$6\frac{2}{3} \times 1\frac{3}{4} =$$

$$17\frac{1}{2} \times 1\frac{5}{9} =$$

$$3. \quad 5\frac{2}{5} \times 2\frac{1}{3} =$$

$$2\frac{2}{9} \times 2\frac{1}{10} =$$

$$12\frac{4}{5} \times 1\frac{3}{16} =$$

$$4. \quad 3\frac{1}{3} \times 4\frac{1}{5} =$$

$$3\frac{4}{14} \times 1\frac{2}{7} =$$

$$5\frac{1}{2} \times 10\frac{2}{3} =$$

$$5. \quad 7\frac{1}{7} \times 3\frac{5}{10} =$$

$$1\frac{7}{8} \times 1\frac{1}{5} =$$

$$8\frac{1}{10} \times 4\frac{2}{9} =$$

$$6. \quad 4\frac{1}{8} \times 1\frac{2}{11} =$$

$$5\frac{3}{5} \times 1\frac{1}{4} =$$

$$16\frac{2}{3} \times 1\frac{4}{5} =$$

$$7. \quad 6\frac{2}{5} \times 1\frac{7}{8} =$$

$$10\frac{1}{2} \times 1\frac{1}{7} =$$

$$22\frac{1}{2} \times 1\frac{1}{9} =$$

$$8. \quad 5\frac{4}{9} \times 2\frac{1}{7} =$$

$$14\frac{2}{3} \times 1\frac{4}{11} =$$

$$18\frac{2}{3} \times 1\frac{1}{14} =$$

$$9. \quad 8\frac{1}{2} \times 2\frac{2}{3} =$$

$$20\frac{2}{3} \times 1\frac{1}{2} =$$

$$14\frac{2}{5} \times 1\frac{3}{4} =$$

64 Fractions in Multiplication, Addition, and Subtraction

HOW IS YOUR MEMORY?

Multiply. Cancel, if possible.

- | | | |
|--|--|--|
| 1. $\frac{2}{3} \times \frac{9}{14} =$ | $\frac{8}{9} \times \frac{3}{4} =$ | $\frac{2}{5} \times \frac{1}{2} =$ |
| 2. $\frac{2}{5} \times \frac{5}{8} =$ | $\frac{1}{2}$ of $\frac{6}{7} =$ | $\frac{3}{4}$ of $\frac{8}{15} =$ |
| 3. $\frac{1}{2} \times \frac{4}{9} \times \frac{3}{4} =$ | $\frac{5}{6} \times \frac{3}{5} \times \frac{4}{11} =$ | $\frac{7}{12} \times \frac{3}{8} \times \frac{2}{7} =$ |

Change to improper fractions.

- | | | | | |
|--------------------|------------------|-----------------|------------------|-----------------|
| 4. $15\frac{5}{6}$ | $35\frac{1}{2}$ | $49\frac{7}{9}$ | $13\frac{5}{12}$ | $81\frac{3}{4}$ |
| 5. $57\frac{3}{5}$ | $26\frac{4}{15}$ | $41\frac{2}{3}$ | $17\frac{5}{9}$ | $37\frac{4}{7}$ |
| 6. $54\frac{2}{5}$ | $18\frac{1}{2}$ | $63\frac{2}{3}$ | $22\frac{7}{12}$ | $30\frac{1}{2}$ |

Multiply. Cancel, if possible.

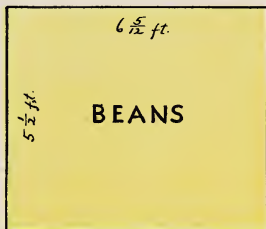
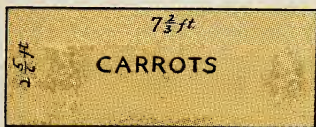
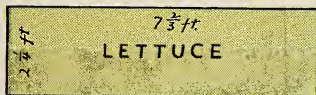
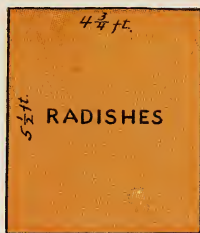
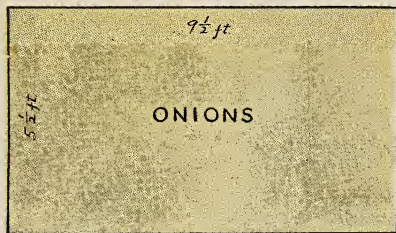
- | | | |
|---|---------------------------------------|---------------------------------------|
| 7. $\frac{4}{9} \times 3\frac{1}{2} =$ | $\frac{4}{7} \times 8\frac{2}{5} =$ | $\frac{3}{4} \times 1\frac{3}{5} =$ |
| 8. $\frac{7}{10} \times 1\frac{1}{5} =$ | $\frac{3}{4} \times 1\frac{1}{7} =$ | $\frac{5}{12} \times 2\frac{1}{10} =$ |
| 9. $\frac{5}{8} \times 3\frac{1}{5} =$ | $\frac{7}{15} \times 6\frac{1}{4} =$ | $\frac{4}{7} \times 4\frac{2}{3} =$ |
| 10. $2\frac{1}{12} \times 1\frac{4}{5} =$ | $15\frac{3}{4} \times 4\frac{2}{3} =$ | $12\frac{3}{8} \times 3\frac{2}{6} =$ |

Find the sums.

- | | | |
|-------------------------------------|---------------------------------|---------------------------------|
| 11. $\frac{5}{9} + \frac{2}{3} =$ | $\frac{4}{5} + \frac{9}{10} =$ | $\frac{3}{4} + \frac{7}{8} =$ |
| 12. $2\frac{2}{3} + 1\frac{4}{5} =$ | $3\frac{3}{4} + 5\frac{1}{2} =$ | $6\frac{5}{6} + 3\frac{5}{6} =$ |

Find the remainders.

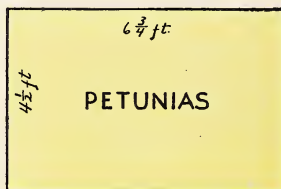
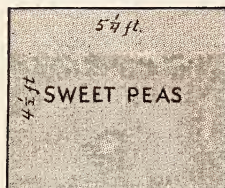
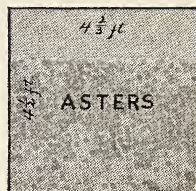
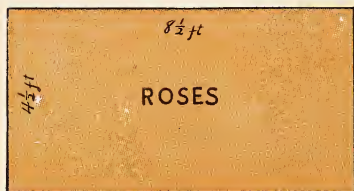
- | | | |
|------------------------------------|---------------------------------|---------------------------------|
| 13. $\frac{7}{8} - \frac{3}{4} =$ | $\frac{6}{7} - \frac{3}{14} =$ | $\frac{9}{10} - \frac{2}{5} =$ |
| 14. $1\frac{1}{3} - \frac{5}{6} =$ | $2\frac{3}{8} - 1\frac{7}{8} =$ | $3\frac{1}{2} - 2\frac{3}{4} =$ |



GEORGE'S VEGETABLE GARDEN

Here is a picture of the vegetable beds in George's garden. We have learned that the area of a rectangle equals the product of its length and width.

1. How many square feet of garden space has George used for onions?
2. How many square feet for radishes?
3. How many square feet for lettuce?
4. How many square feet for carrots?
5. How many square feet for beans?
6. Find the sum of the areas of the lettuce bed and the carrot bed. Is the sum greater or less than the area of the onion bed? How much?



HELEN'S FLOWER GARDEN

Here is a picture of the flower beds in Helen's garden.

1. How many square feet of garden space has Helen used for roses?
2. How many square feet for sweet peas?
3. How many square feet for petunias?
4. How many square feet for asters?
5. Which was greater, the sum of the areas of the beds used for sweet peas and petunias or the sum of the areas of the beds used for roses and asters? How much?
6. Which was greater, the difference between the areas of the beds used for roses and sweet peas or the difference between the areas of the beds used for asters and petunias? How much?

MESSENGER BOYS FIGURING THEIR EARNINGS

1. After school in the afternoon Harold works as a messenger boy. He earns 15¢ an hour. Last month he worked $44\frac{1}{3}$ hours. How much did he earn?
 $44\frac{1}{3} \times \$.15 = ?$

$$\begin{array}{r}
 \$.15 \\
 44\frac{1}{3} \\
 \hline
 5 \\
 60 \\
 60 \\
 \hline
 \$6.65
 \end{array}$$

Multiply: $\frac{1}{3} \times 15 = 5$. The multiplier $\frac{1}{3}$ is $\frac{1}{3}$ of a unit, so write the product 5 in units' place below 4.

Multiply: $4 \times 15 = 60$. Write 60 with 0 under the 4 you multiplied by.

Multiply: $4 \times 15 = 60$. How should you write the 60?

Add. Read the product.

Harold earned \$6.65.

When the mixed number is a large number, such as $44\frac{1}{3}$, it is better to work the problem in the way shown here than to change the mixed number to an improper fraction.

2. Harold's chum, Dick, is also a messenger boy. He earns 15¢ an hour. Last month he worked $37\frac{1}{5}$ hours. How much did he earn?

Multiply.

	A	B	C	D	E	F
3.	32 <u>$10\frac{1}{4}$</u>	48 <u>$12\frac{1}{8}$</u>	24 <u>$14\frac{1}{6}$</u>	35 <u>$13\frac{1}{5}$</u>	42 <u>$16\frac{1}{7}$</u>	28 <u>$11\frac{3}{4}$</u>
4.	44 <u>$15\frac{1}{4}$</u>	36 <u>$12\frac{1}{9}$</u>	25 <u>$13\frac{2}{5}$</u>	54 <u>$12\frac{1}{6}$</u>	22 <u>$15\frac{1}{2}$</u>	33 <u>$12\frac{1}{3}$</u>

Harder Problems in Multiplying a Whole Number by a Mixed Number

FATHERS USE FRACTIONS



1. Mr. Thompson is a street car motorman. He is what is called an extra man, for he works only when he is called. He earns 72¢ an hour. Last week he worked $44\frac{2}{3}$ hours. How much did he earn? $44\frac{2}{3} \times \$.72 = ?$

In problems having as large numbers as these, you may put down the work as shown here.

\$.72
	<u>44$\frac{2}{3}$</u>
	48
	288
	<u>288</u>
\$	32.16

$$\frac{2}{3} \times \frac{24}{1} = \frac{48}{1} = 48.$$

← Multiply 72 by $\frac{2}{3}$.

← Multiply 72 by 4.

← Multiply 72 by 4.

← Add.

Mr. Thompson earned \$32.16.

2. Mr. Barnes has a regular run as a street car motorman. Last week he worked $47\frac{3}{4}$ hours. How much did he earn at 72¢ an hour?

Multiply.

$$\begin{array}{r} 3. \quad 42 \\ \underline{18\frac{3}{4}} \end{array}$$

$$\begin{array}{r} 36 \\ \underline{24\frac{4}{5}} \end{array}$$

$$\begin{array}{r} 63 \\ \underline{13\frac{5}{8}} \end{array}$$

$$\begin{array}{r} 24 \\ \underline{16\frac{3}{7}} \end{array}$$

$$\begin{array}{r} 39 \\ \underline{14\frac{2}{5}} \end{array}$$

$$\begin{array}{r} 27 \\ \underline{11\frac{3}{8}} \end{array}$$

$$\begin{array}{r} 4. \quad 16 \\ \underline{12\frac{2}{3}} \end{array}$$

$$\begin{array}{r} 32 \\ \underline{15\frac{5}{6}} \end{array}$$

$$\begin{array}{r} 48 \\ \underline{14\frac{2}{7}} \end{array}$$

$$\begin{array}{r} 18 \\ \underline{10\frac{3}{5}} \end{array}$$

$$\begin{array}{r} 28 \\ \underline{17\frac{2}{9}} \end{array}$$

$$\begin{array}{r} 37 \\ \underline{15\frac{3}{4}} \end{array}$$

RUNNING A RESTAURANT

1. A restaurant owner bought 24 pounds of pork roast at $12\frac{1}{2}\text{¢}$ a pound. How much should he pay for the meat? $24 \times \$12\frac{1}{2} = ?$

\$	1	$2\frac{1}{2}$
	2	4
<hr/>		
	1	2
	4	8
	2	4
<hr/>		
\$	3	0 0

← Multiply $\frac{1}{2}$ by 24.

← Multiply 12 by 4.

← Multiply 12 by 2.

← Add.

He should pay \$3.00.

2. The same restaurant owner bought 28 pounds of chicken at $32\frac{3}{4}\text{¢}$ a pound. How much should he pay for the chicken? $28 \times 32\frac{3}{4} = ?$

\$	3	$2\frac{3}{4}$
	2	8
<hr/>		
	2	1
	2	5 6
	6	4
<hr/>		
\$	9	1 7

$$\frac{28}{1} \times \frac{3}{4} = \frac{21}{1} = 21.$$

← Multiply $\frac{3}{4}$ by 28.

← Multiply 32 by 8.

← Multiply 32 by 2.

← Add.

He should pay \$9.17.

3. He bought 20 pounds of pork chops at $13\frac{1}{4}\text{¢}$ a pound. How much did the pork chops cost?

Multiply.

4. $42\frac{2}{5}$
15

$64\frac{1}{2}$
18

$36\frac{2}{9}$
27

$28\frac{3}{4}$
12

$37\frac{1}{2}$
19

5. $45\frac{1}{6}$
24

$54\frac{2}{3}$
21

$106\frac{1}{2}$
13

$233\frac{3}{4}$
18

$118\frac{2}{3}$
22



ROBERT IN HIS FATHER'S STORE

Robert helps his father each Saturday in the grocery store. Could you solve these problems if you were helping in the store?

1. Cheese sells for 24¢ a pound. Mrs. Smith asks for 15¢ worth of cheese. What part of a pound should she get?

2. Mr. Johnson wants $\frac{1}{2}$ pound of coffee. The coffee that he wants costs 38¢ a pound. How much should Robert charge Mr. Johnson?

3. Oranges sell for 24¢ a dozen. Mrs. Dixon buys $\frac{3}{4}$ dozen. How much should she have to pay?

4. Peanut candy is 32¢ a pound. Irene asks for 10¢ worth. How many ounces should Robert give her?

5. Mrs. Snyder wants 15¢ worth of cookies that are 40¢ a pound. How many ounces should Robert give her?

6. Prunes sell for $11\frac{1}{2}$ ¢ a pound. What should Mrs. Johnson pay for four pounds?

7. Mrs. Glenn wants 25¢ worth of tea that is 40¢ a pound. How many ounces should Robert give her?

CAN YOU DO THESE?

1. A restaurant owner bought 36 cans of peas. He used $\frac{3}{4}$ of them in one week. How many cans did he have left?

2. A fur coat that was priced at \$325 early in the season remained unsold. The merchant decided to offer it for sale at a reduced price. He marked it for sale at $\frac{3}{5}$ of its first price. What was the sale price?

3. Mr. Clark works at a garage that is $\frac{7}{8}$ of a mile from his home. He walks this distance four times a day. How many miles does he walk in going back and forth to work each day?

4. Fifteen girls in a sewing class are making towels. Each girl is making two towels. It takes $\frac{3}{4}$ yard for each towel. How much material is needed for all the towels?

5. A jeweler has $\frac{5}{8}$ gross of fountain pens on hand. During a sale he sells $\frac{4}{5}$ of them. What part of a gross does he have left after the sale?

6. James has $1\frac{1}{2}$ pages of problems to work over the week-end. On Friday evening he works $\frac{1}{3}$ of that amount. How many pages does he still have to work?

7. Helen's father works $7\frac{1}{2}$ hours each day. If he works 5 days each week, how many hours does he work in 4 weeks?

8. A grocer made a profit of $4\frac{1}{2}\text{¢}$ on each dozen eggs that he sold. Last week he sold $27\frac{1}{3}$ dozen. What was his profit?

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples on this page. If you make mistakes in any row, she will have you do others of the same kind on the next page. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her.

Multiplication

$$1. \quad \frac{3}{4} \times 30 = \quad \frac{4}{9} \times 10 = \quad \frac{2}{7} \times 2 = \quad \frac{1}{4} \times 4 =$$

$$2. \quad 3 \times \frac{2}{11} = \quad 3 \times \frac{2}{9} = \quad 6 \times \frac{1}{3} = \quad 10 \times \frac{1}{8} =$$

$$3. \quad \frac{2}{9} \times \frac{6}{14} = \quad \frac{4}{15} \times \frac{5}{9} = \quad \frac{1}{5} \times \frac{10}{11} = \quad \frac{1}{2} \times \frac{1}{3} =$$

$$4. \quad 8 \times 2\frac{1}{4} = \quad 5 \times 2\frac{1}{10} = \quad 8 \times 4\frac{1}{3} = \quad 7 \times 3\frac{1}{6} =$$

$$5. \quad \frac{4}{5} \times 2\frac{1}{8} = \quad \frac{5}{8} \times 2\frac{1}{3} = \quad \frac{1}{3} \times 2\frac{1}{7} = \quad \frac{1}{5} \times 2\frac{1}{3} =$$

$$6. \quad 3\frac{1}{10} \times 10 = \quad 4\frac{1}{4} \times 8 = \quad 9\frac{2}{3} \times \frac{2}{9} = \quad 8\frac{1}{4} \times \frac{4}{11} =$$

$$7. \quad 2\frac{1}{10} \times 1\frac{1}{14} = \quad 4\frac{2}{3} \times 2\frac{1}{4} = \quad 2\frac{1}{12} \times 4\frac{4}{5} = \quad 1\frac{1}{3} \times 3\frac{1}{5} =$$

$$8. \quad 8 \times \frac{1}{7} = \quad \frac{2}{5} \times 16 = \quad 9 \times \frac{3}{5} = \quad \frac{7}{8} \times 21 =$$

$$9. \quad \begin{array}{r} 25 \\ \underline{2\frac{1}{5}} \end{array} \quad \begin{array}{r} 33\frac{2}{3} \\ \underline{15} \end{array} \quad \begin{array}{r} 21 \\ \underline{14\frac{2}{7}} \end{array} \quad \begin{array}{r} 17\frac{1}{5} \\ \underline{20} \end{array}$$

CURING OUR WEAK SPOTS

Use these examples after the test on page 72.

Multiplication

$$1. \quad \frac{2}{3} \times 20 = \quad \frac{3}{4} \times 5 = \quad \frac{1}{6} \times 5 = \quad \frac{1}{3} \times 3 =$$

$$2. \quad 3 \times \frac{2}{7} = \quad 2 \times \frac{3}{8} = \quad 4 \times \frac{1}{2} = \quad 12 \times \frac{1}{9} =$$

$$3. \quad \frac{3}{4} \times \frac{2}{3} = \quad \frac{2}{7} \times \frac{7}{12} = \quad \frac{1}{4} \times \frac{8}{9} = \quad \frac{1}{3} \times \frac{1}{4} =$$

$$4. \quad 3 \times 3\frac{2}{3} = \quad 4 \times 3\frac{1}{8} = \quad 6 \times 2\frac{2}{5} = \quad 3 \times 2\frac{1}{2} =$$

$$5. \quad \frac{7}{8} \times 2\frac{1}{5} = \quad \frac{2}{3} \times 2\frac{3}{8} = \quad \frac{1}{5} \times 3\frac{1}{8} = \quad \frac{1}{6} \times 4\frac{1}{3} =$$

$$6. \quad 5\frac{1}{8} \times 8 = \quad 6\frac{1}{2} \times 4 = \quad 5\frac{1}{3} \times \frac{5}{8} = \quad 9\frac{3}{5} \times \frac{5}{12} =$$

$$7. \quad 1\frac{1}{5} \times 2\frac{1}{12} = \quad 2\frac{3}{4} \times 3\frac{1}{3} = \quad 1\frac{4}{5} \times 6\frac{2}{3} = \quad 1\frac{1}{8} \times 2\frac{1}{5} =$$

$$8. \quad 21 \times \frac{7}{8} = \quad \frac{3}{5} \times 9 = \quad 16 \times \frac{2}{5} = \quad \frac{1}{7} \times 8 =$$

$$9. \quad \begin{array}{r} 40 \\ \underline{3\frac{1}{8}} \end{array} \quad \begin{array}{r} 22\frac{1}{4} \\ \underline{16} \end{array} \quad \begin{array}{r} 30 \\ \underline{12\frac{3}{5}} \end{array} \quad \begin{array}{r} 15\frac{1}{5} \\ \underline{10} \end{array}$$

EVER HAVE EXAMPLES LIKE THESE?**Addition**

1.	$\begin{array}{r} 348 \\ 756 \\ \hline \end{array}$	$\begin{array}{r} 241 \\ 789 \\ \hline \end{array}$	$\begin{array}{r} 322 \\ 478 \\ \hline \end{array}$	$\begin{array}{r} 390 \\ 519 \\ \hline \end{array}$	$\begin{array}{r} 709 \\ 601 \\ \hline \end{array}$	$\begin{array}{r} 850 \\ 750 \\ \hline \end{array}$
----	---	---	---	---	---	---

2.	$\begin{array}{r} 5107 \\ 6593 \\ \hline \end{array}$	$\begin{array}{r} 6800 \\ 1500 \\ \hline \end{array}$	$\begin{array}{r} 1385 \\ 1645 \\ \hline \end{array}$	$\begin{array}{r} 1498 \\ 7565 \\ \hline \end{array}$	$\begin{array}{r} 4242 \\ 5856 \\ \hline \end{array}$	$\begin{array}{r} 5150 \\ 5850 \\ \hline \end{array}$
----	---	---	---	---	---	---

Subtraction

3.	$\begin{array}{r} 450 \\ 199 \\ \hline \end{array}$	$\begin{array}{r} 700 \\ 222 \\ \hline \end{array}$	$\begin{array}{r} 599 \\ 488 \\ \hline \end{array}$	$\begin{array}{r} 654 \\ 397 \\ \hline \end{array}$	$\begin{array}{r} 690 \\ 581 \\ \hline \end{array}$	$\begin{array}{r} 411 \\ 302 \\ \hline \end{array}$
----	---	---	---	---	---	---

4.	$\begin{array}{r} \$45.00 \\ 1.99 \\ \hline \end{array}$	$\begin{array}{r} \$10.85 \\ 5.85 \\ \hline \end{array}$	$\begin{array}{r} \$15.80 \\ 12.75 \\ \hline \end{array}$	$\begin{array}{r} \$14.35 \\ 10.95 \\ \hline \end{array}$	$\begin{array}{r} \$25.25 \\ 20.06 \\ \hline \end{array}$	$\begin{array}{r} \$30.01 \\ 6.09 \\ \hline \end{array}$
----	--	--	---	---	---	--

Multiplication

5.	$\begin{array}{r} 155 \\ 21 \\ \hline \end{array}$	$\begin{array}{r} 650 \\ 40 \\ \hline \end{array}$	$\begin{array}{r} 708 \\ 99 \\ \hline \end{array}$	$\begin{array}{r} 600 \\ 50 \\ \hline \end{array}$	$\begin{array}{r} 786 \\ 97 \\ \hline \end{array}$	$\begin{array}{r} 649 \\ 78 \\ \hline \end{array}$
----	--	--	--	--	--	--

6.	$\begin{array}{r} 104 \\ 100 \\ \hline \end{array}$	$\begin{array}{r} 605 \\ 208 \\ \hline \end{array}$	$\begin{array}{r} 545 \\ 700 \\ \hline \end{array}$	$\begin{array}{r} 358 \\ 300 \\ \hline \end{array}$	$\begin{array}{r} 957 \\ 786 \\ \hline \end{array}$	$\begin{array}{r} 450 \\ 450 \\ \hline \end{array}$
----	---	---	---	---	---	---

Division

7.	$26 \overline{)2340}$	$38 \overline{)3098}$	$41 \overline{)41082}$	$35 \overline{)10535}$
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$150 \overline{)3750}$	$310 \overline{)33480}$	$121 \overline{)98010}$	$199 \overline{)19104}$
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CUTTING BADGES



1. Some of the sixth grade girls are measuring and cutting ribbon badges for Field Day. Each badge takes 6 inches, or $\frac{1}{6}$ yd. The girls have one piece of ribbon 24 inches, or $\frac{2}{3}$ yd., long. How many badges can be made from it? $\frac{2}{3} \div \frac{1}{6} = ?$

Do you remember from your fifth grade work that to divide a fraction by a fraction you invert the divisor and multiply? Always cancel, if possible.

Divide.

$$2. \quad \frac{5}{8} \div \frac{5}{8} = \quad \frac{2}{5} \div \frac{1}{3} = \quad \frac{4}{11} \div \frac{4}{11} = \quad \frac{5}{18} \div \frac{5}{6} =$$

$$3. \quad \frac{8}{9} \div \frac{1}{2} = \quad \frac{2}{5} \div \frac{2}{5} = \quad \frac{1}{15} \div \frac{1}{2} = \quad \frac{9}{16} \div \frac{3}{4} =$$

$$4. \quad \frac{1}{12} \div \frac{1}{4} = \quad \frac{5}{12} \div \frac{3}{4} = \quad \frac{1}{6} \div \frac{1}{3} = \quad \frac{19}{20} \div \frac{1}{4} =$$

$$5. \quad \frac{1}{11} \div \frac{1}{8} = \quad \frac{7}{8} \div \frac{1}{3} = \quad \frac{7}{8} \div \frac{1}{4} = \quad \frac{5}{14} \div \frac{2}{5} =$$

$$6. \quad \frac{1}{7} \div \frac{1}{4} = \quad \frac{1}{6} \div \frac{3}{8} = \quad \frac{5}{12} \div \frac{15}{16} = \quad \frac{1}{6} \div \frac{1}{6} =$$

$$7. \quad \frac{3}{16} \div \frac{9}{10} = \quad \frac{7}{9} \div \frac{7}{9} = \quad \frac{3}{8} \div \frac{1}{2} = \quad \frac{4}{5} \div \frac{1}{2} =$$

$$8. \quad \frac{7}{18} \div \frac{14}{15} = \quad \frac{1}{14} \div \frac{1}{5} = \quad \frac{7}{10} \div \frac{2}{3} = \quad \frac{7}{8} \div \frac{3}{4} =$$

$$9. \quad \frac{9}{10} \div \frac{1}{3} = \quad \frac{17}{20} \div \frac{1}{4} = \quad \frac{4}{15} \div \frac{4}{15} = \quad \frac{8}{9} \div \frac{2}{3} =$$

$$10. \quad \frac{4}{9} \div \frac{2}{3} = \quad \frac{7}{12} \div \frac{7}{9} = \quad \frac{1}{24} \div \frac{1}{8} = \quad \frac{11}{12} \div \frac{5}{6} =$$

$$11. \quad \frac{7}{12} \div \frac{3}{4} = \quad \frac{5}{18} \div \frac{1}{3} = \quad \frac{3}{20} \div \frac{1}{7} = \quad \frac{5}{8} \div \frac{5}{12} =$$

76 Dividing a Whole Number by a Fraction

SELLING THINGS

1. Each Saturday Mrs. Temple bakes cakes to sell. She needs $\frac{1}{4}$ dozen eggs for each cake. If she uses 2 dozen eggs, how many cakes does she bake?

Do you remember from your fifth grade work how to divide a whole number by a fraction? Here are the three steps:

- (a) Invert the divisor. (b) Cancel, if possible.
(c) Multiply.

2. In the early spring Bob's mother sells daffodils. She ties them in bunches, each bunch containing $\frac{3}{4}$ dozen daffodils. One day she sold 27 dozen. How many bunches did she sell? How much did she get for them at 25¢ a bunch?

3. Mr. Bennett, a candy dealer, made 26 pounds of candy which he packed in $\frac{1}{2}$ pound boxes. How many boxes did he use?

4. A dealer who sells pencils made a profit of $\frac{3}{4}$ cent on each 3-cent pencil. His profit yesterday on 3-cent pencils was 45¢. How many did he sell?

5. It took Mr. Clark $\frac{2}{3}$ hour to travel in his car from Jonesville to Huntington, a distance of 24 miles. What was his average speed an hour?

Divide.

- | | | | |
|-----------------------------|-------------------------|-------------------------|--------------------------|
| 6. $14 \div \frac{2}{7} =$ | $24 \div \frac{3}{8} =$ | $12 \div \frac{3}{8} =$ | $8 \div \frac{3}{4} =$ |
| 7. $20 \div \frac{4}{5} =$ | $16 \div \frac{2}{3} =$ | $8 \div \frac{1}{3} =$ | $14 \div \frac{4}{11} =$ |
| 8. $12 \div \frac{3}{4} =$ | $25 \div \frac{5}{6} =$ | $27 \div \frac{3}{4} =$ | $16 \div \frac{6}{7} =$ |
| 9. $10 \div \frac{3}{5} =$ | $40 \div \frac{5}{8} =$ | $7 \div \frac{1}{2} =$ | $48 \div \frac{8}{9} =$ |
| 10. $21 \div \frac{3}{7} =$ | $9 \div \frac{2}{3} =$ | $10 \div \frac{4}{9} =$ | $9 \div \frac{3}{5} =$ |
| 11. $15 \div \frac{3}{5} =$ | $18 \div \frac{4}{7} =$ | $30 \div \frac{2}{3} =$ | $18 \div \frac{3}{10} =$ |



PROBLEMS WE MEET AT HOME

1. Mrs. Palmer gave her two little girls, Jennie and Elizabeth, $\frac{3}{4}$ yard of silk that she did not need. Each girl wanted to make a scarf for her doll, so they divided the silk into two equal pieces. How much silk did each girl get? $\frac{3}{4} \div 2 = ?$

$$\frac{3}{4} \div \frac{2}{1} = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$$

To divide a fraction by a whole number, write the whole number as a fraction, invert the divisor, and multiply.

The 2 means the same as $\frac{2}{1}$. When you invert $\frac{2}{1}$ it becomes $\frac{1}{2}$.

2. Mrs. Benson bought $\frac{1}{2}$ pound of butter. It lasted 2 days. What was the average amount of butter used in 1 day?

3. Mrs. Crawford is making jelly. She finds that $\frac{1}{2}$ pint of jelly will fill 3 small glasses of the same size. How much jelly will one of these small glasses hold?

Divide. You should always cancel, if possible.

$$4. \quad \frac{1}{8} \div 2 = \quad \frac{3}{4} \div 12 = \quad \frac{7}{12} \div 14 = \quad \frac{5}{8} \div 10 =$$

$$5. \quad \frac{1}{12} \div 3 = \quad \frac{8}{9} \div 4 = \quad \frac{2}{3} \div 8 = \quad \frac{3}{4} \div 6 =$$

78 Dividing a Mixed Number by a Fraction

THESE ARE SUPPOSED TO BE HARD

1. In April Mr. Gilbert paid \$13 $\frac{1}{2}$ for $\frac{3}{4}$ T. of hard coal. What was the price of a ton?

To divide a mixed number by a fraction, first change the mixed number to an improper fraction, then invert the divisor and multiply. Cancel, if possible.

2. Mr. Turner traveled 31 $\frac{1}{2}$ miles in his car in $\frac{3}{4}$ hour. What was his average rate of speed an hour?

3. Helen is helping her mother make some towels. They have 5 $\frac{1}{4}$ yards of toweling. They use $\frac{7}{8}$ yard for each towel. How many towels can they make?

Divide.

$$4. \quad 6\frac{1}{2} \div \frac{1}{4} = \quad 12\frac{1}{4} \div \frac{7}{8} = \quad 9\frac{3}{5} \div \frac{8}{15} = \quad 5\frac{1}{3} \div \frac{6}{7} =$$

$$5. \quad 8\frac{2}{3} \div \frac{1}{3} = \quad 11\frac{5}{8} \div \frac{3}{16} = \quad 3\frac{3}{10} \div \frac{3}{5} = \quad 7\frac{1}{2} \div \frac{3}{4} =$$

$$6. \quad 14\frac{1}{2} \div \frac{5}{7} = \quad 14\frac{2}{5} \div \frac{9}{10} = \quad 4\frac{6}{7} \div \frac{9}{14} = \quad 8\frac{1}{6} \div \frac{7}{8} =$$

$$7. \quad 10\frac{2}{3} \div \frac{8}{9} = \quad 1\frac{1}{5} \div \frac{7}{10} = \quad 6\frac{2}{3} \div \frac{4}{5} = \quad 2\frac{4}{9} \div \frac{2}{3} =$$

$$8. \quad 7\frac{5}{6} \div \frac{1}{2} = \quad 8\frac{3}{12} \div \frac{3}{4} = \quad 4\frac{2}{7} \div \frac{5}{6} = \quad 3\frac{1}{5} \div \frac{8}{9} =$$

$$9. \quad 9\frac{3}{4} \div \frac{3}{8} = \quad 3\frac{5}{8} \div \frac{15}{16} = \quad 9\frac{3}{4} \div \frac{13}{16} = \quad 13\frac{2}{3} \div \frac{7}{9} =$$

$$10. \quad 17\frac{1}{2} \div \frac{5}{6} = \quad 14\frac{2}{3} \div \frac{11}{8} = \quad 7\frac{1}{2} \div \frac{3}{8} = \quad 4\frac{1}{8} \div \frac{3}{4} =$$

FINDING HOW WELL YOU CAN SOLVE PROBLEMS

Time, 22 minutes. Your score will be twice the number of problems you solve correctly in that time.

1. The sixth grade in the Mark Twain school has 42 pupils in it. The boys are $\frac{3}{7}$ of the class. How many boys are in the class?

2. Lois has $4\frac{1}{2}$ yd. of material from which to make aprons for the Good Will club. She uses $\frac{3}{4}$ yd. in each apron. How many aprons can Lois make with $4\frac{1}{2}$ yd.?

3. When Esther was working on the dress she made last summer, she cut $2\frac{3}{4}$ yd. from a piece of goods that contained $6\frac{1}{2}$ yd. How much was left?

4. Bob is making a dog kennel. He sawed some boards each $5\frac{1}{2}$ feet long from boards 12 feet long. How many of the $5\frac{1}{2}$ -foot boards could Bob saw from one of the 12-foot boards?

5. How many of the 12-foot boards would Bob need to make 8 of the $5\frac{1}{2}$ -foot boards? How many waste pieces would be left?

6. Bob also is planning to build a birdhouse. He has to buy some lumber for this. He wants 6 pieces, each 8 in., or $\frac{2}{3}$ ft., long. Tell in feet how long a board he needs to buy.

7. Ben, Bob's brother, has a rabbit. He needs new woven wire for the rabbit hutch. He knows that the wire comes in the right width for the cage and that he needs $37\frac{1}{2}$ inches in length. How many feet is this? Remember to change $37\frac{1}{2}$ to a fraction.

80 Diagnostic Test in Division of Fractions

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples on this page. If you make mistakes in any row, she will have you do others of the same kind on the next page. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her.

Division

1. $3 \div \frac{6}{7} =$ $18 \div \frac{4}{9} =$ $7 \div \frac{3}{4} =$ $10 \div \frac{2}{5} =$

2. $\frac{1}{8} \div \frac{1}{4} =$ $\frac{7}{10} \div \frac{7}{10} =$ $\frac{1}{5} \div \frac{1}{4} =$ $\frac{11}{15} \div \frac{3}{5} =$

3. $1\frac{1}{24} \div \frac{5}{16} =$ $2\frac{3}{4} \div \frac{9}{10} =$ $3\frac{1}{4} \div \frac{1}{4} =$ $1\frac{1}{6} \div \frac{1}{2} =$

4. $\frac{1}{8} \div 8 =$ $\frac{7}{8} \div 2 =$ $\frac{3}{7} \div 3 =$ $\frac{8}{9} \div 12 =$

5. $1\frac{1}{7} \div 3 =$ $3\frac{1}{3} \div 6 =$ $4\frac{3}{5} \div 4 =$ $6\frac{1}{4} \div 5 =$

6. $\frac{1}{12} \div 1\frac{3}{4} =$ $\frac{7}{8} \div 1\frac{1}{2} =$ $\frac{2}{9} \div 1\frac{2}{5} =$ $\frac{1}{10} \div 1\frac{1}{3} =$

7. $1 \div 3\frac{1}{2} =$ $3 \div 3\frac{3}{5} =$ $8 \div 5\frac{1}{2} =$ $10 \div 3\frac{1}{3} =$

8. $4\frac{1}{4} \div 1\frac{1}{3} =$ $5\frac{1}{6} \div 5\frac{1}{6} =$ $1\frac{1}{5} \div 1\frac{4}{5} =$ $2\frac{3}{4} \div 5\frac{1}{3} =$

CURING OUR WEAK SPOTS

Use these examples after the test on page 80, if you made mistakes.

Division

$$1. \quad 4 \div \frac{8}{9} = \quad 14 \div \frac{7}{10} = \quad 8 \div \frac{2}{3} = \quad 6 \div \frac{5}{8} =$$

$$2. \quad \frac{1}{9} \div \frac{1}{3} = \quad \frac{7}{8} \div \frac{7}{8} = \quad \frac{1}{3} \div \frac{1}{2} = \quad \frac{4}{5} \div \frac{3}{10} =$$

$$3. \quad 1\frac{1}{15} \div \frac{1}{9} = \quad 4\frac{2}{3} \div \frac{5}{12} = \quad 4\frac{1}{3} \div \frac{1}{3} = \quad 2\frac{1}{4} \div \frac{1}{2} =$$

$$4. \quad \frac{1}{5} \div 5 = \quad \frac{5}{9} \div 3 = \quad \frac{5}{8} \div 5 = \quad \frac{7}{8} \div 14 =$$

$$\frac{1}{2} \div 2 = \quad \frac{3}{4} \div 6 = \quad \frac{9}{10} \div 18 = \quad \frac{2}{3} \div 4 =$$

$$5. \quad 3\frac{1}{5} \div 7 = \quad 3\frac{3}{5} \div 10 = \quad 4\frac{3}{8} \div 5 = \quad 5\frac{3}{9} \div 4 =$$

$$6. \quad \frac{1}{10} \div 1\frac{1}{2} = \quad \frac{5}{8} \div 2\frac{1}{4} = \quad \frac{3}{7} \div 3\frac{1}{3} = \quad \frac{1}{8} \div 2\frac{2}{3} =$$

$$7. \quad 1 \div 2\frac{1}{2} = \quad 2 \div 4\frac{2}{3} = \quad 6 \div 3\frac{1}{3} = \quad 9 \div 4\frac{1}{2} =$$

$$8. \quad 5\frac{3}{5} \div 2\frac{1}{4} = \quad 6\frac{2}{3} \div 6\frac{2}{3} = \quad 1\frac{1}{4} \div 1\frac{3}{4} = \quad 3\frac{5}{8} \div 5\frac{1}{5} =$$

$$2\frac{1}{3} \div \frac{2}{7} = \quad 1\frac{4}{5} \div 4\frac{1}{2} = \quad 2\frac{5}{8} \div 5\frac{1}{4} = \quad 9\frac{1}{2} \div 4\frac{3}{4} =$$

SHORTENING OUR WORK

1. How did you divide a fraction by a fraction?

$$\frac{3}{4} \div \frac{1}{12} = \frac{3}{4} \times \frac{12}{1} = 9$$

You inverted the divisor and multiplied.

2. How did you divide a whole number by a fraction?

$$14 \div \frac{2}{7} = 14 \times \frac{7}{2} = 49$$

You inverted the divisor and multiplied.

3. How did you divide a fraction by a whole number?

$$\frac{8}{9} \div 2 = \frac{8}{9} \times \frac{1}{2} = \frac{4}{9}$$

Explain it.

4. How did you divide a mixed number by a fraction?

$$12\frac{1}{2} \div \frac{5}{6} = 12\frac{2}{2} \div \frac{5}{6} = 12\frac{2}{2} \times \frac{6}{5} = 15$$

(a) You changed the mixed number to an improper fraction.

(b) Then you inverted the divisor and multiplied.

5. What did you do *every time* you divided in the above examples?

6. Ed has the job of splitting a pile of firewood for winter use. He has split $\frac{1}{2}$ of the pile in $3\frac{1}{2}$ Saturdays. What part of the pile has he averaged a day?

$$\frac{1}{2} \div 3\frac{1}{2} = \frac{1}{2} \div \frac{7}{2} = \frac{1}{2} \times \frac{2}{7} =$$

(a) What was done first?

(b) What was done next?

Finish it yourself.

7. How many gallons of gasoline at $15\frac{1}{2}\text{¢}$ a gallon can Ellen buy for 93¢?

$$93 \div 15\frac{1}{2} =$$

- (a) Change the mixed number to an improper fraction.
- (b) Invert the divisor and multiply.
Do the work yourself.

8. In 3 hours Carl dug $2\frac{1}{2}$ rows of potatoes. What was the average number of rows he dug each hour?

$$2\frac{1}{2} \div 3 =$$

- (a) What should be done first?
- (b) What should be done next?
Do the work yourself.

9. Sam dug $7\frac{1}{2}$ rows of potatoes in $6\frac{1}{2}$ hours. What was the average number of rows dug by Sam each hour?

$$7\frac{1}{2} \div 6\frac{1}{2} =$$

- (a) What should be done first?
- (b) What should be done next?
Do the work yourself.

10. Sam's brother, Phil, dug potatoes faster than Sam. He dug $8\frac{1}{3}$ rows in $6\frac{2}{3}$ hours. What was the average number of rows dug by Phil each hour?

When you have fractions or mixed numbers in division:

- (a) Change mixed numbers, if there are any, to improper fractions.
- (b) Invert the divisor and multiply.

WINNERS' PAGE

For pupils who made no mistakes on pages 80 and 81. Special merit for finishing correctly in less than 22 minutes.

1. Add. Time, 4 minutes.

$$(a) \frac{2}{3} + \frac{5}{9} + \frac{1}{6} + \frac{8}{9} + \frac{5}{6} =$$

$$(b) 1\frac{1}{2} + 2 + 4\frac{2}{3} + 2\frac{5}{6} + 1 =$$

$$(c) 145\frac{1}{2} + 90 + 155\frac{1}{4} + 105\frac{3}{4} + 3\frac{3}{8} =$$

2. Subtract. Time, 5 minutes.

$$(a) \frac{5}{6} - \frac{2}{3} =$$

$$\frac{4}{5} - \frac{1}{10} =$$

$$\frac{3}{4} - \frac{3}{8} =$$

$$(b) 8\frac{1}{3} - 7\frac{2}{3} =$$

$$4\frac{1}{2} - 1\frac{3}{4} =$$

$$16 - 10\frac{7}{8} =$$

$$(c) 92\frac{1}{3} - 82\frac{2}{3} =$$

$$6\frac{1}{4} - 1\frac{3}{4} =$$

$$21\frac{3}{4} - 16\frac{7}{8} =$$

3. Multiply. Time, 4 minutes.

$$(a) \frac{3}{4} \times \frac{5}{8} =$$

$$\frac{3}{5} \times \frac{4}{7} =$$

$$\frac{7}{10} \times \frac{3}{8} =$$

$$(b) \frac{4}{5} \times \frac{5}{12} =$$

$$\frac{2}{3} \times \frac{7}{8} =$$

$$\frac{4}{9} \times \frac{3}{8} =$$

$$(c) 4\frac{1}{2} \times 1\frac{1}{3} =$$

$$2\frac{3}{4} \times 1\frac{5}{7} =$$

$$\frac{2}{3} \times 1\frac{1}{2} =$$

4. Divide. Time, 6 minutes.

$$(a) \frac{1}{3} \div \frac{1}{2} =$$

$$\frac{4}{5} \div \frac{2}{5} =$$

$$\frac{5}{6} \div \frac{5}{12} =$$

$$(b) 1\frac{1}{3} \div \frac{3}{4} =$$

$$1\frac{1}{8} \div \frac{3}{8} =$$

$$\frac{1}{25} \div 5 =$$

$$(c) 4\frac{1}{5} \div 2\frac{1}{10} =$$

$$6 \div \frac{1}{4} =$$

$$19 \div 9\frac{1}{2} =$$

5. Do what the signs indicate. Time, 3 minutes.

$$(a) 1 \div 2\frac{3}{4} =$$

$$2\frac{1}{2} - \frac{3}{4} =$$

$$8\frac{1}{3} + 6\frac{2}{5} =$$

$$(b) 10 \times 2\frac{3}{5} =$$

$$20\frac{3}{4} + 19\frac{1}{2} =$$

$$5\frac{1}{3} \div 2\frac{1}{4} =$$

CHAPTER III

DECIMALS IN EVERYDAY LIFE

Reading Tenths and Hundredths



WHAT DO YOU REMEMBER ABOUT THESE?

See if you can remember some of the things you have learned about decimals.

1. By the north road it is 6.5 miles from Edgar's home to Clarion. $6.5 = \text{six and five} \frac{\quad}{10} = 6\frac{5}{10}$.

2. By the south road it is 6.75 miles from Edgar's home to Clarion. $6.75 = \text{six and seventy-five} \frac{\quad}{100} = 6\frac{75}{100}$.

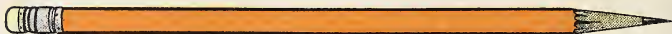
3. When you read the decimal point in 6.5 and 6.75 you say $\frac{\quad}{10}$.

The decimal point should never be left out in reading or writing decimals. It shows that the number written after it is some *part* of a whole unit. .5 means $\frac{5}{10}$ of a unit; .18 means $\frac{18}{100}$ of a unit; and 2.07 means 2 and $\frac{7}{100}$ of a unit.

One figure after the decimal point is read tenths. Two figures after the decimal point is read hundredths.

SOMETHING NEW

The decimals that you have studied so far have been only tenths and hundredths. There are other decimals that show smaller parts of a thing than tenths or hundredths.



Suppose that you buy a penny pencil. You can write the cost of the pencil as one cent, or $\frac{1}{100}$ of a dollar, or \$.01.

You can write one-tenth of a cent in these ways: $\frac{1}{10}$ of a cent, or $\frac{1}{1000}$ of a dollar, or \$.001.

$$1 \text{ cent} = \frac{1}{100} \text{ dollar}$$

$$\frac{1}{10} \text{ cent} = \frac{1}{10} \times \frac{1}{100} \text{ dollar} = \frac{1}{1000} \text{ dollar}$$

\$.001 is the same as $\frac{1}{1000}$ of a dollar. So the next decimal place after hundredths is thousandths.

A three-place decimal is read thousandths.

Watch how these decimals are read:

.006 is read six thousandths

.023 is read twenty-three thousandths

.435 is read four hundred thirty-five thousandths

2.120 is read two *and* one hundred twenty thousandths

Write these fractions as decimals and read them:

1. $\frac{2}{1000}$

$\frac{28}{1000}$

$\frac{192}{1000}$

3 $\frac{15}{1000}$

$\frac{68}{1000}$

2. $\frac{546}{1000}$

6 $\frac{6}{1000}$

11 $\frac{102}{1000}$

$\frac{8}{1000}$

$\frac{22}{1000}$

DECIMALS NOT OFTEN USED

A smaller decimal than tenths, hundredths, and thousandths is ten-thousandths.

1. A grocer has strawberries left unsold on Saturday night. Knowing that they will not keep till Monday morning, he says jokingly, he will sell them so as to make not more than $\frac{1}{100}$ of a cent on a box. In what ways can we write $\frac{1}{100}$ of a cent?



$$1 \text{ cent} = \frac{1}{100} \text{ dollar}$$

$$\frac{1}{100} \text{ cent} = \frac{1}{100} \times \frac{1}{100} \text{ dollar} = \frac{1}{10000} \text{ dollar}$$

$\frac{1}{100}$ cent may be written $\frac{1}{10000}$ dollar.

$\frac{1}{10000}$ dollar may be written \$.0001.

$\frac{1}{10000}$ dollar and \$.0001 are read just the same—one ten-thousandth dollar.

A four-place decimal is read ten-thousandths.

2. Now see how these decimals are read. They are used in fine mechanical work:

.0004 is read four ten-thousandths

.0125 is read one hundred twenty-five ten-thousandths

.5150 is read five thousand one-hundred fifty ten-thousandths

1.0606 is read one *and* six-hundred-six ten-thousandths

3. Such a decimal as \$.0001 is too small for use in actual money, just as a measure of .0001 of an inch is too small to see. But .0001 of a mile is large enough for us to see, for it is about 6 inches.

A CHART THAT WILL HELP YOU

On this number chart you can see the names of whole numbers from units to millions, shown to the left of the decimal point. You can also see the names of decimals from tenths to ten-thousandths, shown to the right of the decimal point.

Millions	Hundred Thou- sands	Ten Thousands	Thousands	Hundreds	Tens	Units	Decimal Point	Tenths	Hundredths	Thousandths	Ten-Thousandths
					2	5	.	4	5	5	
						3	.	1	3	1	6
							.	0	0	0	0

The numbers on the chart are read in this way:

.4 is read 4 *tenths*

2.15 is read 2 and 15 *hundredths*

25.035 is read 25 and 35 *thousandths*

.0016 is read 16 *ten-thousandths*

Some things we have learned:

The decimal point is read *and* in a decimal.

A decimal is called tenths if there is just one figure after the decimal point.

A decimal is called hundredths if there are just two figures after the decimal point.

A decimal is called thousandths if there are three figures after the decimal point.

MAKING A CHART

Draw a number chart like that on page 88. Write the following numbers on it and then read each one.

1. 6.0 16.001 .0008 261.01 28.80

2. 1.7650 20.002 54.15 715.004 .0402

Read the following decimals. Look at your chart if you need to.

3. 65.6 .0018 14.0087 .0061 50.005

4. 13005.13 4.1356 1000.001 30.1006 .009

Decimals, like ten-thousandths, are used in very fine work such as making some parts of machines or watches. Scientists also use them to measure a fleck of dust or a tiny animal under a microscope.

5. Which is larger: .2 of a mile or .02 of a mile?

6. When a zero is placed after tenths, the value of the decimal is not changed. $\$.3 = \$.30$. Why?

7. Show that the following decimals are alike in value: .5 and .50; .7 and .70; .8 and .80; .2 and .20. You can show this by drawings of small squares, or by common fractions.

Write the following numbers in order of size from the largest to the smallest.

8. .65 .0008 .0067 .51 .09

9. .0006 .0004 1. .4 .0015

In each number below the figure 4 appears. It has a different value in each case. Write the numbers in order of size from the largest to the smallest.

10. .04 .004 4. .4 .0004

Changing Decimals to Common Fractions

In the fifth grade you studied about hundredths and you learned that five hundredths may be written as $\frac{5}{100}$ or as .05. You see, we can write hundredths in two ways. Both ways mean the same thing, and they are read in the same way.

1. Write the value of each of these numbers in two ways. On your paper place the words "Decimals" and "Common Fractions," and put each form of the number under the correct title.

fourteen hundredths	sixty-four hundredths
eight hundredths	fifty-nine hundredths
twenty-two hundredths	two hundredths

The value of any decimal may be written as a common fraction. The decimal .95 is the same as $\frac{95}{100}$. In the same way, .5 is the same as $\frac{5}{10}$, .82 is the same as $\frac{82}{100}$, .06 is the same as $\frac{6}{100}$, .10 is $\frac{10}{100}$, .3 is $\frac{3}{10}$, .55 is $\frac{55}{100}$, .04 is $\frac{4}{100}$, .1 is $\frac{1}{10}$, and .01 is $\frac{1}{100}$.

Some decimals can be changed to common fractions that can be reduced to lower terms. In all such examples, reduce the common fractions to the lowest terms.

2. Change .25 to a common fraction.

$$.25 = \frac{25}{100} = \frac{5}{20} = \frac{1}{4}$$

$$.40 = \frac{40}{100} = \frac{4}{10} = \frac{2}{5}$$

Notice that in examples like those in exercise 2 the common fraction, when in its lowest terms, does not have the same name, or denominator. 25 hundredths = 1 fourth; 40 hundredths = 2 fifths.

Changing Decimals to Common Fractions

91

1. Carl paid 65 cents for a baseball glove. What part of a dollar did he pay for the glove?

$$65¢ = \$.65$$

$$.65 = \frac{65}{100}$$

$$\frac{65}{100} = \frac{13}{20}$$

Write 65¢ as a decimal part of a dollar.

Change the decimal to a common fraction and reduce.

Carl paid $\frac{13}{20}$ of a dollar for the glove.

2. Geraldine received 75 cents for taking care of Mrs. Alden's baby three afternoons. What part of a dollar did Geraldine receive for this work?

3. Mike saw a knife marked "45¢" in a store. He had just a dollar. If he bought the knife, what part of his money would he have to pay for it?

In some problems you may have mixed decimals, such as 2.25 and 10.8. Notice below how you can solve such problems.

4. On the register of the speedometer in the car, Ruth saw that her father had driven 18.5 miles since they started. She read it to her father as $18\frac{1}{2}$ miles. Is 18.5 the same as $18\frac{1}{2}$? Why?

$$18.5 = 18\frac{5}{10}$$

$$\frac{5}{10} = \frac{1}{2}$$

$$18\frac{5}{10} = 18\frac{1}{2}$$

$$18.5 = 18\frac{1}{2}$$

Change the fractional part of the number, and write it.

Reduce the fraction.

Write the mixed number in the usual way.

5. Write the same values as the following in common fractions or mixed numbers.

.8 .15 1.6 25.25 2.02 .95 \$4.75

NAMING AND WRITING DECIMALS

This test will show how well you know the names of decimal places. Number a paper from 1 to 10.

Part I

Copy and write the name of each decimal. The name of the first one is **tenths**.

1. A one-place decimal is named tenths
2. A three-place decimal is named _____
3. A four-place decimal is named _____
4. A two-place decimal is named _____

Part II

Write in words the number of places in the decimal, as **one-place** for number 5.

5. Tenths is a one-place decimal.
6. Thousandths is a _____ decimal.
7. Hundred-thousandths is a _____ decimal.
8. Hundredths is a _____ decimal.
9. Ten-thousandths is a _____ decimal.

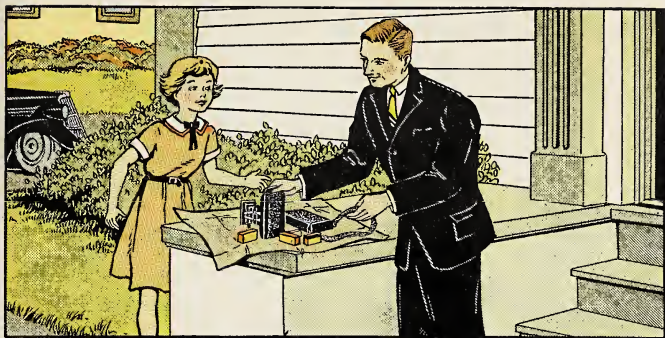
Part III

Write these numbers in figures in a column. Keep the decimal points in a straight line.

10. Twenty-two hundredths
11. Eighty-five ten-thousandths
12. Five and five thousandths
13. Forty and two tenths
14. Seventeen and eight ten-thousandths

Write these numbers as decimals.

15. $\frac{4}{10}$ $\frac{51}{100}$ $\frac{28}{1000}$ $3\frac{77}{1000}$ $31\frac{13}{10000}$ $6\frac{16}{100}$



MARTHA'S KODAK

1. Martha's uncle bought her a kodak outfit to take to Yellowstone Park. He paid \$8.89 for the kodak, \$2.45 for a carrying case, and \$2.40 for 4 rolls of films. How much did he pay for all?

$\$8.89 + \$2.45 + \$2.40 = ?$

\$ 8.89
2.45
2.40
<hr/> \$13.74

You have had problems like this before. Keep decimal points under each other. Add.

Martha's uncle paid \$13.74.

2. On February 27, 1934, the price of £1 (one pound) English money in New York was \$5.065. Late in March the English pound was quoted in New York at \$5.10. How much had the pound increased in quoted price in that month? $\$5.10 - \$5.065 = ?$

\$5.100
5.065
<hr/> \$.035

Write a zero in the minuend. Keep decimal points in a column. Subtract. The difference is \$.035. Check by adding remainder and subtrahend.

94 Adding and Subtracting Decimals

Add and check.

- | | | | | |
|----|---|---|--|---|
| 1. | \$2.53
8.10
4.95
.76
.08
<hr/> | .17
10.18
.09
2.74
.89
<hr/> | \$51.8
11.
3.9
40.7
.03
<hr/> | 10.6
.07
120.
6.40
.02
<hr/> |
| 2. | 44.
2.03
.7
242.19
.02
<hr/> | 38.5
.006
1.49
9.203
.405
<hr/> | 3.61
.7
38.
.008
.76
<hr/> | 330.
4.6
.123
5.01
98.33
<hr/> |
| 3. | 3.904
.281
8.71
.156
.04
<hr/> | 13.006
28.194
52.530
10.008
36.621
<hr/> | 3.68
28.256
.18
1.008
<hr/> | 6.71
32.
137.275
10.3
<hr/> |

Subtract and check. Write zeros in the minuend if they are needed.

- | | | | | | |
|----|-----------------------|-------------------------|------------------------|-------------------------|---------------------------|
| 4. | .645
<hr/> | .8
.236
<hr/> | .563
.248
<hr/> | .7
.654
<hr/> | .8
.009
<hr/> |
| 5. | 7.5
3.47
<hr/> | 67.8
5.9
<hr/> | 12.2
7.09
<hr/> | 4.57
.9
<hr/> | 10.
6.94
<hr/> |
| 6. | 5.02
.76
<hr/> | 17.2
8.09
<hr/> | 82.2
47.9
<hr/> | 27.13
9.04
<hr/> | 100.2
61.39
<hr/> |
| 7. | 15.5
7.55
<hr/> | 5.031
2.975
<hr/> | 60.
34.052
<hr/> | 1.037
.7008
<hr/> | 42.001
25.193
<hr/> |

WATCH THE DECIMAL POINT

Many mistakes in decimals are caused by decimal points. Copy these examples, add, and check. Keep the decimal points straight.

$$1. 5.06 + 3.05 + 1.07 = ? \quad 2. 4.75 + 3.146 + 4.6 = ?$$

$$3. 4.62 + 5 + 18.794 = ? \quad 4. 4.83 + 1.197 + 8.7 = ?$$

$$5. 2.003 + 1.8 + .07 + .508 + .064 + .2 = ?$$

$$6. 4.5 + 15 + 32.03 + 11.54 + .057 + .109 = ?$$

$$7. .31 + 6.82 + 105 + 3.05 + 48.6 + .705 = ?$$

$$8. .8095 + 4.1 + 48 + 1.876 + .0064 + 30.03 = ?$$

$$9. 5.6 + 34.1 + 919.07 + 20 + .06 + 50.0807 = ?$$

$$10. 125 + 141 + .56 + .6709 + .601 + 1.012 = ?$$

$$11. 11.157 + 1.1157 + 111.57 + 1115.7 + .11157 = ?$$

$$12. .0214 + 100.08 + 40.700 + 3.805 + .00005 = ?$$

13. A lumber company in northern Michigan shipped 30.51 tons of poles, 29.20 tons of railroad ties, 30 tons of wood pulp, and 26.29 tons of lumber. How many tons of forest products were shipped?

Copying and Subtracting Decimals

Copy and subtract. Write zeros in the minuend if they are needed.

$$14. 134.6 - .0068 = ?$$

$$98.7 - 3.005 = ?$$

$$15. 5.00008 - 2.89 = ?$$

$$12.5 - 4.0607 = ?$$

$$16. 1.265 - .0073 = ?$$

$$44.06 - 36.1007 = ?$$

$$17. 400.1 - 100.81 = ?$$

$$100 - 14.003 = ?$$

$$18. 10 - .03041 = ?$$

$$42.25 - 4.251 = ?$$

$$19. .7285 - .11805 = ?$$

$$.451 - .3109 = ?$$

96 **Adding and Subtracting Decimals in Problems**



1. Elsie has a new rainy-day outfit. She paid \$4.98 for the raincoat, \$.89 for her hat, \$1.49 for galoshes, and \$2.68 for an umbrella. How much did she pay for all?

2. The Mason twins are going to the movies Saturday afternoon with their mother and grandmother. Tickets cost \$.25 each for children, and \$.55 each for grown people. How much will all their tickets cost?

3. The cost of educating a public school pupil in 1928 was \$130.60 a year in Washington, D. C. It was \$105 in Des Moines, Iowa. How much less was the cost of educating a child in Des Moines than in Washington?

4. A carload of wheat weighs 40.93 tons. How much more is this than a carload of corn, which weighs 37.31 tons?

5. In the Gold Cup Motor Boat Race in 1918, the winning boat, Miss Detroit III, made an average speed of 52.1 miles an hour. How much higher or lower was this than the average of 70.0 miles an hour made by the winning boat, El Lagarto, in 1933?

6. Dick's mother went to the vegetable market where she paid \$.13 for carrots, \$.29 for celery, \$.17 for cabbage, \$.34 for green beans, and \$.62 for potatoes. What did she pay for all the vegetables?

Adding and Subtracting Decimals in Problems 97

7. From 1910 to 1915, Ty Cobb led the American League in batting, with averages of .377, .385, .420, .410, .390, and .370. What was the difference between his best and his poorest average?



8. Ted's father bought him a violin for \$38.95. The dealer said the former price was \$50.00. How much less was the sale price than the former price?

9. The price of an ounce of gold was a little more than \$20.67 in the United States in 1929. In 1934 it was \$35.00. What was the difference in price in the two years?

10. The heaviest rainfall on record in New York was 9.4 inches in 24 hours. The next heaviest was 6.17 inches. How many inches difference is there between the two records?

11. Arnold's mother wants new baby scales, so that she can weigh the baby every week. The price at one store is \$3.70 for the scales, and \$1.59 for a baby basket. At another store she can get both the scales and the basket for \$4.29. How much can she save by ordering from the second store?

12. Marvin got \$5 for his birthday. He has a list of things he would like and the price of each. This is his list: basket ball, \$2.98; football, \$3.25; sweater, \$2.85; baseball glove, \$2.39; baseball, \$1.19; tennis racket, \$4.25; and punching bag, \$.57. Marvin wants to buy as many of these things as he can with his \$5. What should he buy?

1. Earl sold 30 bunches of asparagus the first week in May. The second week he sold .8 as many. How many bunches did Earl sell in the second week? $.8 \times 30 = ?$

$$\begin{array}{r} 30 \\ .8 \\ \hline 24.0 \end{array}$$

$$.8 = \frac{8}{10}$$

$$\frac{8}{10} \times \overset{3}{\cancel{30}} = 24$$

Point off one decimal place in the product in the first method.
Earl sold 24 bunches.

In multiplying decimals, point off as many places in the product as there are decimal places in the multiplicand and the multiplier.

2. Earl sold his asparagus at 40¢ a bunch. What should he receive for 54 bunches? $54 \times \$.40 = ?$

$$\begin{array}{r} \$.40 \\ 54 \\ \hline 160 \\ 200 \\ \hline \$21.60 \end{array}$$

$$\$.40 = \$ \frac{40}{100}$$

$$54 \times \$ \frac{40}{100} =$$

$$\$ \frac{2160}{100} =$$

$$\$21.60$$

Cancellation could be used.
Earl received \$21.60.

3. Mr. Nash sold strawberries for \$.25 a quart. He estimated that .2 of this amount was gain. What was his estimated gain on each quart? $.2 \times \$.25 = ?$

$$\begin{array}{r} \$.25 \\ .2 \\ \hline \$.050 \end{array}$$

$$\$.25 = \$ \frac{25}{100}$$

$$.2 = \frac{2}{10}$$

$$\frac{2}{10} \times \$ \frac{25}{100} =$$

$$\$ \frac{50}{1000} = \$.05$$

Cancellation could be used.
Mr. Nash had a gain of \$.05 on each quart.

In the first method you need 3 decimal places in the product. Write 0 at the left of 5 and point off.

The decimal points have been left out of these products. Copy the products and place a decimal point where it belongs in each product. If you need more places in the product, write zeros before the product.

$$\begin{array}{r} 1. \quad 3.16 \\ \quad \quad 4 \\ \hline 1264 \end{array} \quad \begin{array}{r} .18 \\ \quad \quad 5 \\ \hline 90 \end{array} \quad \begin{array}{r} 6.05 \\ \quad \quad 3 \\ \hline 1815 \end{array} \quad \begin{array}{r} 320 \\ \quad \quad .06 \\ \hline 1920 \end{array} \quad \begin{array}{r} .175 \\ \quad \quad .5 \\ \hline 875 \end{array}$$

$$\begin{array}{r} 2. \quad .586 \\ \quad .003 \\ \hline 1758 \end{array} \quad \begin{array}{r} 2.09 \\ \quad \quad 9 \\ \hline 1881 \end{array} \quad \begin{array}{r} 7.14 \\ \quad \quad .8 \\ \hline 5712 \end{array} \quad \begin{array}{r} 2.4 \\ \quad .007 \\ \hline 168 \end{array} \quad \begin{array}{r} 2500 \\ \quad .02 \\ \hline 5000 \end{array}$$

Write the products on a paper. Do not write the examples or do any multiplying on paper.

$$\begin{array}{lll} 3. \quad 5 \times .5 = ? & 6 \times .05 = ? & 6 \times .005 = ? \\ 4. \quad 3 \times .4 = ? & 4 \times .04 = ? & 6 \times .007 = ? \\ 5. \quad 7 \times .8 = ? & 8 \times .02 = ? & 8 \times .003 = ? \end{array}$$

6. May went to the store to buy typewriting paper. Lucas Bond paper was priced at \$.21 for 100 sheets. Railroad Manila was priced at $\frac{1}{3}$ as much as Lucas Bond. What was the price of Railroad Manila? $\frac{1}{3} \times \$.21 = ?$

$$\$.21 = \$ \frac{21}{100}$$

← Change .21 to a fraction.

$$\frac{1}{3} \times \frac{21}{100} = \frac{7}{100}$$

← Multiply, using cancellation.

$$\$ \frac{7}{100} = \$.07$$

← Change $\frac{7}{100}$ to a decimal.

The Railroad Manila would cost \$.07.

$$\begin{array}{lll} 7. \quad \frac{1}{2} \text{ of } .24 = ? & \frac{1}{3} \text{ of } .18 = ? & \frac{1}{5} \text{ of } 4.5 = ? \\ 8. \quad \frac{1}{6} \text{ of } .006 = ? & \frac{1}{9} \text{ of } 18.9 = ? & \frac{1}{4} \text{ of } .080 = ? \\ 9. \quad .6 \times .3 = ? & .4 \times .07 = ? & .6 \times .09 = ? \\ 10. \quad .5 \times .12 = ? & .9 \times .06 = ? & .7 \times .07 = ? \end{array}$$

DO YOU KNOW DECIMAL PLACES?

Below is a test to show if you know how to place the decimal points in multiplication. Tell the number of decimal places in the product, as: "A 1-place decimal times a 3-place decimal gives a 4-place decimal." Do not copy the test. Number your paper from 1 to 9. When your teacher tells you to start, see if you can write the answers quickly and correctly.

1. A 1-place decimal times a 3-place decimal gives a _____ decimal.
2. A 1-place decimal times a 1-place decimal gives a _____ decimal.
3. A whole number times a 4-place decimal gives a _____ decimal.
4. A 3-place decimal times a whole number gives a _____ decimal.
5. A 2-place decimal times a whole number gives a _____ decimal.
6. A whole number times a 5-place decimal gives a _____ decimal.
7. A 1-place decimal times a 2-place decimal gives a _____ decimal.
8. A 4-place decimal times a whole number gives a _____ decimal.
9. A 2-place decimal times a 2-place decimal gives a _____ decimal.

EXAMPLES OF DIFFERENT KINDS

Multiply. Write the products on your paper. Write zeros before the figures in the product, if needed.

$$\begin{array}{r} 1. \quad 5.3 \\ \quad \underline{7} \end{array} \quad \begin{array}{r} 4.6 \\ \quad \underline{5} \end{array} \quad \begin{array}{r} 6.14 \\ \quad \underline{7} \end{array} \quad \begin{array}{r} 2.513 \\ \quad \underline{5} \end{array} \quad \begin{array}{r} 35 \\ \quad \underline{.6} \end{array}$$

$$\begin{array}{r} 2. \quad 59 \\ \quad \underline{.8} \end{array} \quad \begin{array}{r} 86 \\ \quad \underline{1.3} \end{array} \quad \begin{array}{r} 6.8 \\ \quad \underline{15} \end{array} \quad \begin{array}{r} 8.3 \\ \quad \underline{5.8} \end{array} \quad \begin{array}{r} 4.5 \\ \quad \underline{8.6} \end{array}$$

$$\begin{array}{r} 3. \quad 19.2 \\ \quad \underline{.32} \end{array} \quad \begin{array}{r} 23.4 \\ \quad \underline{.61} \end{array} \quad \begin{array}{r} 5.03 \\ \quad \underline{.07} \end{array} \quad \begin{array}{r} 3.04 \\ \quad \underline{.09} \end{array} \quad \begin{array}{r} 9.05 \\ \quad \underline{.04} \end{array}$$

$$4. \quad \frac{5}{8} \text{ of } 5.6 = ?$$

$$\frac{6}{7} \text{ of } 15.4 = ?$$

$$5. \quad \frac{2}{9} \text{ of } .828 = ?$$

$$\frac{4}{5} \text{ of } 5.605 = ?$$

$$6. \quad .02 \times 36 \times \frac{1}{3} = ?$$

$$.07 \times 40 \times \frac{1}{2} = ?$$

$$7. \quad 2.1 \times 16 \times \frac{1}{8} = ?$$

$$.9 \times .134 = ?$$

$$8. \quad .32 \times 24.6 = ?$$

$$.07 \times 1.09 = ?$$

$$9. \quad 8.6 \times 47 = ?$$

$$5 \times 3.977 = ?$$

10. Lloyd gained 12.5 pounds last year. Nancy's gain was .5 of Lloyd's. How many pounds did Nancy gain?

11. Mr. Ward's corn crop this year was 4875 bushels. Last year his crop was .80 as large. How many bushels did he have last year?

12. Yesterday Tom's father ordered 7 tons of soft coal at \$8.13 a ton. What did it cost him?

SHORT CUTS IN MULTIPLICATION

Do you remember the short way to multiply a decimal by 10?

$$10 \times 3.7 = 37.$$

$$10 \times 13.31 = 133.1$$

$$10 \times 2.06 = 20.6$$

$$10 \times \$.55 = \$5.5$$

To multiply a decimal by 10, move the decimal point one place to the right.

Here is a short way in which you can multiply a decimal by 100.

$$100 \times .12 = 12.$$

$$100 \times 2.08 = 208.$$

$$100 \times 3.4 = 340.$$

$$100 \times .5 = 50.$$

To multiply a decimal by 100, move the decimal point two places to the right. Write a zero, if needed.

Now see if you can multiply a decimal by 1000.

1. $1000 \times .339 = \underline{\hspace{2cm}}$ 2. $1000 \times .25 = \underline{\hspace{2cm}}$

3. $1000 \times .2 = \underline{\hspace{2cm}}$ 4. $1000 \times 1.517 = \underline{\hspace{2cm}}$

5. $1000 \times 4.17 = \underline{\hspace{2cm}}$ 6. $1000 \times 3.4 = \underline{\hspace{2cm}}$

To multiply a decimal by 1000, move the decimal point three places to the right. Write zeros, if needed.

MORE SHORT CUTS

A short way of multiplying by .1 is shown below.

$$.1 \times \$3.40 = \$.34$$

$$.1 \times 45 = 4.5$$

$$.1 \times .8 = .08$$

$$.1 \times 76 = 7.6$$

To multiply by .1 move the decimal point one place to the left. Write a zero, if needed.

A short way of multiplying by .01 is shown below.

$$.01 \times \$15 = \$.15$$

$$.01 \times 5.75 = .0575$$

$$.01 \times .45 = .0045$$

$$.01 \times .6 = .006$$

To multiply by .01 move the decimal point two places to the left. Write zeros, if needed.

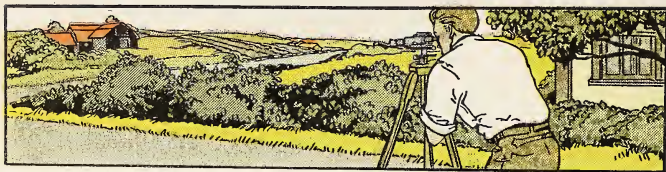
In all the examples below use a short way of multiplying. Write the answers without multiplying on paper. Look at the rules above if you do not know them.

1.	<u>7.7</u> <u>10</u>	<u>7.7</u> <u>100</u>	<u>.83</u> <u>.1</u>	<u>6.31</u> <u>100</u>	<u>.29</u> <u>100</u>
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2.	<u>.63</u> <u>10</u>	<u>9.3</u> <u>.1</u>	<u>8.7</u> <u>1000</u>	<u>.009</u> <u>1000</u>	<u>.06</u> <u>100</u>
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3.	<u>30.9</u> <u>.01</u>	<u>.6</u> <u>10</u>	<u>240.</u> <u>.1</u>	<u>2.006</u> <u>.1</u>	<u>5.81</u> <u>.01</u>
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4.	<u>\$.25</u> <u>1000</u>	<u>927</u> <u>.1</u>	<u>298</u> <u>.01</u>	<u>.706</u> <u>10</u>	<u>8.104</u> <u>100</u>
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MEASURING A HIGHWAY

1. A highway engineer measured the amount of paving that needed repair. He reported one strip 8 chains long. How many rods was this? (An engineer's chain is 100 ft. long or 6.0606 rd.)

2. Mrs. Burns bought a 60-yard bolt of muslin to make costumes for the school play. The muslin cost $\$.12\frac{1}{2}$ (\$.125) a yard. What did she pay for the bolt?

3. In an 80-acre field a planter averaged 154.2 pounds of cotton an acre. How many pounds did he get from the field?



4. A gardener made a flower bed in the form of a circle. The diameter of the bed was $8\frac{1}{2}$ feet. What was its circumference? (The circumference of a circle is 3.1416 times its diameter.)

5. The mint value of gold was a little more than \$20.6713 a fine ounce in 1930. In 1935 it was \$35 a fine ounce. About what was the increase in mint value of the largest gold bar made, which weighs $483\frac{3}{4}$ ounces?

FINDING OUR WEAK SPOTS

This is a test to show how well you can multiply decimals. Your teacher will give you time to try all the examples. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her in order to find out what the trouble is.

Multiplication

1. A Whole Number \times a Decimal

$$6 \times .5 = ? \qquad 3 \times .03 = ? \qquad 8 \times .005 = ?$$

2. A Whole Number \times a Mixed Number

$$7 \times 3.7 = ? \qquad 4 \times 13.8 = ? \qquad 35 \times 3.4 = ?$$

3. A Decimal \times a Whole Number

32	56	90	20	88	45
<u>.4</u>	<u>.5</u>	<u>.4</u>	<u>.05</u>	<u>.12</u>	<u>.24</u>

4. A Decimal \times a Decimal

.2	.6	.02	.6	.75	.03
<u>.3</u>	<u>.4</u>	<u>.3</u>	<u>.03</u>	<u>.04</u>	<u>.03</u>

5. A Mixed Number \times a Mixed Number

1.8	2.6	8.1	1.02	4.05	3.62
<u>5.2</u>	<u>3.5</u>	<u>3.1</u>	<u>1.02</u>	<u>2.04</u>	<u>3.45</u>

6. $.005 \times 10 = ?$ $.005 \times 100 = ?$ $.005 \times 1000 = ?$

7. $100 \times .1 = ?$ $100 \times .01 = ?$ $100 \times .001 = ?$

If you made mistakes in any row, do the exercises in the row of the same number on page 106.

CURING OUR WEAK SPOTS

If you made mistakes in any row of the test on page 105, do the examples in the row of the same number in these exercises.

Multiplication

1. A Whole Number \times a Decimal

$$7 \times .6 = ? \qquad 3 \times .02 = ? \qquad 5 \times .004 = ?$$

2. A Whole Number \times a Mixed Number

$$6 \times 2.8 = ? \qquad 3 \times 15.5 = ? \qquad 25 \times 2.8 = ?$$

3. A Decimal \times a Whole Number

24	46	70	30	55	64
<u>.2</u>	<u>.8</u>	<u>.6</u>	<u>.05</u>	<u>.15</u>	<u>.34</u>

4. A Decimal \times a Decimal

.4	.7	.04	.8	.55	.04
<u>.2</u>	<u>.3</u>	<u>.2</u>	<u>.02</u>	<u>.06</u>	<u>.02</u>

5. A Mixed Number \times a Mixed Number

1.5	3.4	6.2	2.03	5.04	5.45
<u>2.5</u>	<u>3.5</u>	<u>3.1</u>	<u>2.03</u>	<u>4.05</u>	<u>2.54</u>

6. $.004 \times 10 = ?$ $.004 \times 100 = ?$ $.004 \times 1000 = ?$

7. $200 \times .1 = ?$ $200 \times .01 = ?$ $200 \times .001 = ?$

HOW IS YOUR MEMORY?

Add.

- | | | | | | | |
|----|---|---|---|---|--|--|
| 1. | $\frac{1}{3}$
<u>$\frac{1}{3}$</u> | $\frac{3}{4}$
<u>$\frac{1}{4}$</u> | $1\frac{1}{4}$
<u>$2\frac{1}{4}$</u> | $2\frac{2}{3}$
<u>$2\frac{2}{3}$</u> | $\frac{7}{8}$
<u>$4\frac{5}{8}$</u> | $2\frac{3}{5}$
<u>$3\frac{2}{5}$</u> |
| 2. | $\frac{1}{2}$
<u>$\frac{1}{4}$</u>
<u>$\frac{1}{4}$</u> | $\frac{1}{3}$
<u>$\frac{1}{2}$</u>
<u>$\frac{1}{4}$</u> | $\frac{7}{8}$
<u>$\frac{3}{4}$</u>
<u>$\frac{1}{6}$</u> | $1\frac{1}{5}$
<u>$5\frac{3}{10}$</u> | $4\frac{1}{2}$
<u>$6\frac{3}{4}$</u> | $\frac{2}{3}$
<u>$\frac{5}{6}$</u> |

Subtract.

- | | | | | | | |
|----|--|--|--|--|--|--|
| 3. | $\frac{3}{4}$
<u>$\frac{1}{4}$</u> | $1\frac{1}{4}$
<u>$\frac{1}{4}$</u> | $6\frac{5}{8}$
<u>$1\frac{1}{8}$</u> | 4
<u>$\frac{1}{2}$</u> | 5
<u>$\frac{1}{4}$</u> | 3
<u>$1\frac{1}{3}$</u> |
| 4. | $\frac{1}{4}$
<u>$\frac{1}{5}$</u> | $3\frac{1}{3}$
<u>$1\frac{2}{3}$</u> | $6\frac{1}{2}$
<u>$1\frac{3}{4}$</u> | $5\frac{1}{8}$
<u>$2\frac{1}{4}$</u> | $4\frac{1}{4}$
<u>$1\frac{7}{8}$</u> | $7\frac{3}{4}$
<u>$6\frac{3}{4}$</u> |

Multiply.

- | | | | |
|----|--|-----------------------------|--|
| 5. | $\frac{1}{2} \times 4 = ?$ | $\frac{1}{2} \times 2 = ?$ | $2 \times \frac{5}{12} = ?$ |
| 6. | $8 \times \frac{1}{5} = ?$ | $2\frac{1}{3} \times 3 = ?$ | $4\frac{3}{4} \times 6 = ?$ |
| 7. | $2\frac{1}{3} \times 3\frac{1}{2} = ?$ | | $6\frac{7}{8} \times 1\frac{1}{4} = ?$ |

Divide.

- | | | | |
|-----|--------------------------------------|---------------------------|--------------------------------------|
| 8. | $5 \div \frac{3}{5} = ?$ | $2 \div \frac{2}{3} = ?$ | $\frac{7}{8} \div 4 = ?$ |
| 9. | $\frac{4}{5} \div 8 = ?$ | $6 \div 3\frac{3}{4} = ?$ | $12 \div 6\frac{1}{2} = ?$ |
| 10. | $2\frac{1}{2} \div 3\frac{2}{3} = ?$ | $3 \div 1\frac{1}{4} = ?$ | $1\frac{4}{5} \div 4\frac{3}{4} = ?$ |

GETTING YOUR MONEY'S WORTH



1. If Roy buys a season ticket for \$1.38 and goes to only 4 of the 6 games in the season, what is his money loss on the ticket for the 2 games he misses? Two is $\frac{1}{3}$ of 6. Roy misses $\frac{1}{3}$ of the games. $\frac{1}{3}$ of \$1.38 = ?

$$\begin{array}{r} \$.46 \\ 3 \overline{) \$ 1.38} \\ \underline{12} \\ 18 \\ \underline{18} \\ 0 \end{array}$$

Divide \$1.38 by 3 to find $\frac{1}{3}$ of what the ticket cost.

Write the dollar sign and the decimal point in the quotient over those in the dividend.

Divide as with other numbers.

The loss for the two games is 46 cents.

2. John bought 9 blue caps for his baseball team for \$3.15. What was the cost of each cap?

$$\begin{array}{r} \$.\underline{} \\ 9 \overline{) \$ 3.15} \\ \underline{} \\ 45 \\ \underline{} \\ 0 \end{array}$$

Write the numbers on your paper.

Write the dollar sign and the decimal point in the quotient.

Go through the division and find the cost of each cap.

Check by multiplying.

3. Marie bought 14 yd. of cheesecloth for \$1.26 to use in the pageant. She had to make a report of expenses. How much was the cloth a yard?

$$\begin{array}{r} \$.0\underline{} \\ 14 \overline{) \$ 1.26} \\ \underline{} \\ 0 \end{array}$$

14 in 12? 0.

Finish the problem, and check.

Dividing a Decimal by a Whole Number 109

1. The railroad fare of 5 boys in a basket-ball team going to a game was \$8.20. How much was this for one boy? $\$8.20 \div 5 = ?$

$$\begin{array}{r} \$1.64 \\ 5 \overline{) \$8.20} \\ \underline{5} \\ 32 \\ \underline{30} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

Write the \$ and the decimal point in the quotient over those in the dividend.

Divide. The quotient is \$1.64.
The fare for one boy was \$1.64.

Check: $5 \times \$1.64 = \8.20 .

2. In a strip of carpet 6 yd. long the pattern is shown 8 times. How long is the pattern? $6 \text{ yd.} \div 8 = ?$

$$\begin{array}{r} .75 \\ 8 \overline{) 6.00} \\ \underline{56} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

Place the decimal point in the quotient over that in the dividend.

Put zeros at the right in the dividend so that you can divide.

Divide.

The pattern in the carpet is .75 yd. long.
What common fraction equals .75?

Check: $8 \times .75 = 6$.

In dividing a decimal by a whole number, place the decimal point in the quotient over that in the dividend. If necessary, put zeros at the right in the dividend. Then divide, as in other numbers.

Copy and complete the following examples:

$$\begin{array}{llllll} 3. & 6 \overline{) 9.36} & 4 \overline{) 18.4} & 9 \overline{) 17.1} & 2 \overline{) 11.} & 7 \overline{) 32.9} \\ & 5 \overline{) 1.} & 3 \overline{) 31.5} & 8 \overline{) 162.} & 4 \overline{) 43.} & 6 \overline{) 15.3} \end{array}$$

110 Explaining Decimal Points in Division

The following examples are worked correctly. Look at them carefully and tell why the decimal points are placed where they are in the quotient.

$$\begin{array}{r}
 1. \quad \begin{array}{r} \$.40 \\ 17 \overline{) \$ 6.80} \\ \underline{68} \\ 0 \end{array} \qquad \begin{array}{r} 6.1 \\ 6 \overline{) 36.6} \\ \underline{36} \\ 6 \\ \underline{6} \end{array} \qquad \begin{array}{r} .5 \\ 64 \overline{) 32.0} \\ \underline{320} \\ 0 \end{array} \qquad \begin{array}{r} .02 \\ 73 \overline{) 1.46} \\ \underline{146} \end{array}
 \end{array}$$

$$\begin{array}{r}
 2. \quad \begin{array}{r} .51 \\ 47 \overline{) 23.97} \\ \underline{235} \\ 47 \\ \underline{47} \end{array} \qquad \begin{array}{r} 3.9 \\ 13 \overline{) 50.7} \\ \underline{39} \\ 117 \\ \underline{117} \end{array} \qquad \begin{array}{r} .53 \\ 86 \overline{) 45.58} \\ \underline{430} \\ 258 \\ \underline{258} \end{array} \qquad \begin{array}{r} .13 \\ 6 \overline{) .78} \\ \underline{6} \\ 18 \\ \underline{18} \end{array}
 \end{array}$$

Copy, divide, and check. Remember to write your decimal point in the quotient before you divide.

$$3. \quad \begin{array}{r} 5 \overline{) 2.5} \end{array} \qquad \begin{array}{r} 8 \overline{) 9.12} \end{array} \qquad \begin{array}{r} 3 \overline{) 9.} \end{array} \qquad \begin{array}{r} 7 \overline{) 4.9} \end{array}$$

$$4. \quad \begin{array}{r} 8 \overline{) .64} \end{array} \qquad \begin{array}{r} 6 \overline{) \$388.80} \end{array} \qquad \begin{array}{r} 14 \overline{) 42.} \end{array} \qquad \begin{array}{r} 11 \overline{) .132} \end{array}$$

$$5. \quad \begin{array}{r} 64 \overline{) 32.} \end{array} \qquad \begin{array}{r} 8 \overline{) 6.} \end{array} \qquad \begin{array}{r} 13 \overline{) 39.013} \end{array} \qquad \begin{array}{r} 56 \overline{) 80.64} \end{array}$$

$$6. \quad 29.76 \div 62 = \qquad 4 \div 8 = \qquad 3.5 \div 70 =$$

$$7. \quad 8.12 \div 28 = \qquad 5.4 \div 3 = \qquad \$56.55 \div 65 =$$

$$8. \quad 4.2 \div 28 = \qquad 44.32 \div 53 = \qquad 6 \div 13 =$$

$$9. \quad 5.60 \div 40 = \qquad 3.9 \div 30 = \qquad 70. \div 175 =$$

$$10. \text{ Divide } 371.7 \text{ by } 59 \qquad 13. \text{ Divide } 1.10 \text{ by } 275$$

$$11. \text{ Divide } 11 \text{ by } 275 \qquad 14. \text{ Divide } 3.717 \text{ by } 59$$

$$12. \text{ Divide } .76 \text{ by } 19 \qquad 15. \text{ Divide } 17.48 \text{ by } 46$$

SELLING THINGS FROM FARM AND GARDEN

1. Ben lives on a farm in Iowa. Last summer he sold 1050 ears of green corn in the city. How many dozen did he sell? $1050 \div 12 = ?$

2. One summer Ben sold only 510 ears of green corn. How many dozen did he sell that summer?



3. Claire sells peaches at a roadside stand for her mother. She took in \$32.00 for 25 large baskets of the early peaches. What was the average price for each basket?

4. At the end of the season Joe found he had received \$20 for the new potatoes and the turnips he had sold. He said \$16 of this money came from his sale of potatoes. What part of the money came from the sale of potatoes?

5. Ruth and Sue took care of the chickens. In July and August they sold 85 lb. of fryers, for which they received \$24.65. What was the average price a pound?

6. In his farm work, Chester helped take care of the live stock. One month he sold a calf and two yearling lambs for \$15.50. He sold the calf for \$8. The two lambs were equal in value. What was the selling price of each lamb?

7. In United States money, what coin has the same value as $\frac{1}{8}$ of \$2?

Changing Common Fractions to Decimals

Every common fraction can be changed to a decimal of the same value in the way shown below. Study these examples and see how to change common fractions to decimals.

1. Change $\frac{1}{25}$ to a decimal.

$$\begin{array}{r} .04 \\ 25 \overline{)1.00} \end{array}$$

Write the numerator (1.00) as the dividend.

Write the denominator (25) as the divisor.

Place the decimal point in the quotient above the decimal point in the dividend.

Divide.

$$\frac{1}{25} = .04$$

2. Change $\frac{3}{8}$ to a decimal.

One Way

$$\begin{array}{r} .37\frac{1}{2} \\ 8 \overline{)3.00} \end{array}$$

Write 3.00 as the dividend.

Write 8 as the divisor.

Place the decimal point in the quotient.

Divide. Write the remainder as $\frac{1}{2}$.

$$\frac{3}{8} = .37\frac{1}{2}$$

Another Way

$$\begin{array}{r} .375 \\ 8 \overline{)3.000} \end{array}$$

Write 3.000 as the dividend.

Divide as you did above.

$$\frac{3}{8} = .375$$

To change a common fraction to a decimal, divide the numerator by the denominator. Write as many zeros after the decimal point in the numerator as you need.

Changing Common Fractions to Decimals

113

Change the following common fractions to decimals. Write two decimal zeros in the numerator before you divide. If there is a remainder write it as a common fraction in the quotient, as $\frac{3}{8} = .37\frac{1}{2}$.

- | | | | | |
|-------------------|--------------------|--------------------|--------------------|-------------------|
| 1. $\frac{4}{25}$ | 1. $\frac{15}{50}$ | 1. $\frac{19}{20}$ | 1. $\frac{11}{20}$ | 1. $\frac{3}{4}$ |
| 2. $\frac{1}{8}$ | 2. $\frac{5}{8}$ | 2. $\frac{3}{7}$ | 2. $\frac{41}{50}$ | 2. $\frac{3}{20}$ |
| 3. $\frac{8}{25}$ | 3. $\frac{6}{30}$ | 3. $\frac{12}{25}$ | 3. $\frac{4}{15}$ | 3. $\frac{6}{15}$ |

Change these common fractions to thousandths. How many zeros will you need to write in the numerator of the fraction? If there is a remainder, write it as a common fraction.

- | | | | | |
|-------------------|--------------------|-------------------|-------------------|-------------------|
| 4. $\frac{7}{8}$ | 4. $\frac{1}{3}$ | 4. $\frac{7}{12}$ | 4. $\frac{1}{6}$ | 4. $\frac{9}{40}$ |
| 5. $\frac{4}{11}$ | 5. $\frac{9}{16}$ | 5. $\frac{5}{9}$ | 5. $\frac{5}{12}$ | 5. $\frac{2}{3}$ |
| 6. $\frac{8}{15}$ | 6. $\frac{11}{12}$ | 6. $\frac{2}{11}$ | 6. $\frac{5}{18}$ | 6. $\frac{1}{9}$ |

Rounding Numbers

We have seen by this time that there are some common fractions that cannot be changed to decimals without a remainder. When $\frac{1}{3}$ is changed to a decimal, it is $.33333\frac{1}{3}$. No matter how far you carry it in division, there will always be $\frac{1}{3}$ left. Try it.

Another fraction like this is $\frac{2}{3}$, which is equal to the decimal $.6666\frac{2}{3}$. There is a remainder of $\frac{2}{3}$ no matter how far you carry it in division. Try it.

Usually it is not necessary to carry a decimal beyond thousandths, but the remainder has some value, so we **round the number** at thousandths. We carry the quotient to four places and use the fourth place to round the answer. The examples on the next page will show you how this is done.

Rounding Numbers

1. Change $\frac{3}{7}$ to the nearest thousandth.

$$\begin{array}{r} .4285 + \\ 7 \overline{)3.0000} \end{array}$$

$$\frac{3}{7} = .429$$

The quotient is .4285 with a remainder, which is shown by the sign +.

Look at the fourth figure, which is 5. It is 5 + or more than 5. It is more than $\frac{1}{2}$, so the decimal is not .4285, but .429.

The decimal is rounded to the nearest thousandth.

2. Change $\frac{1}{3}$ to the nearest thousandth.

$$\begin{array}{r} .3333 + \\ 3 \overline{)1.0000} \end{array}$$

$$\frac{1}{3} = .333$$

The quotient is .3333 +.

The fourth figure is 3, which is less than 5. So we drop the 3, and round the answer to .333.

To round a decimal, carry the quotient one place more than the number of places wanted. If the last figure in the quotient is less than 5, drop it. If it is 5 or more, add one to the figure just before it, in the quotient.

Write these decimals, rounded to the nearest thousandth.

3. 3.4567 4.9017 3.1906 .0083 5.9901

4. .0186 .1564 .7432 1.5641 1.7305

Read these decimals, to the nearest hundredth.

5. 14.561 5.678 14.709 16.437 .897

6. 1.008 .329 .101 .453 7.865

Change these common fractions to decimals, rounded to the nearest thousandth.

7. $\frac{3}{7}$

$\frac{8}{11}$

$\frac{1}{16}$

$\frac{8}{21}$

$\frac{2}{3}$

8. $\frac{7}{9}$

$\frac{7}{12}$

$\frac{5}{6}$

$\frac{2}{13}$

$\frac{7}{15}$

FINDING OUR WEAK SPOTS

Number your paper from 1 to 20. Write what is missing in the table below. If a decimal is given, change it to a common fraction or a mixed number, If a common fraction or a mixed number is given, change it to a decimal.

Your teacher will give you time to try all the examples. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her in order to find out what the trouble is.

THE TABLE

	Decimal Fraction	Common Fraction
1.	.35	_____
2.	.75	_____
3.	1.12	_____
4.	_____	$\frac{1}{4}$
5.	_____	$\frac{1}{2}$
6.	.1	_____
7.	3.4	_____
8.	_____	$\frac{3}{5}$
9.	_____	$2\frac{9}{10}$
10.	18.8	_____

	Decimal Fraction	Common Fraction
11.	2.25	_____
12.	_____	$3\frac{2}{5}$
13.	_____	$4\frac{3}{4}$
14.	.2	_____
15.	_____	$5\frac{9}{10}$
16.	11.5	_____
17.	.3	_____
18.	.7	_____
19.	.50	_____
20.	_____	$6\frac{1}{5}$

If you made mistakes in the test, do the exercises in the table on page 116.

CURING OUR WEAK SPOTS

If you made mistakes in the test on page 115, do the following.

Number your paper from 1 to 24. Write what is missing in the table below. If a decimal is given, change it to a common fraction or a mixed number. If a common fraction or a mixed number is given, change it to a decimal.

THE TABLE

	Common Fraction	Decimal Fraction		Common Fraction	Decimal Fraction
1.	$5\frac{1}{5}$	_____	13.	$7\frac{2}{5}$	_____
2.	$\frac{10}{10}$	_____	14.	$1\frac{3}{4}$	_____
3.	$2\frac{1}{4}$	_____	15.	_____	.9
4.	_____	1.5	16.	$9\frac{1}{5}$	_____
5.	$50\frac{1}{2}$	_____	17.	_____	7.8
6.	_____	32.7	18.	_____	6.25
7.	_____	.55	19.	$\frac{9}{10}$	_____
8.	_____	.72	20.	_____	1.75
9.	$5\frac{3}{10}$	_____	21.	$2\frac{9}{10}$	_____
10.	$\frac{12}{100}$	_____	22.	$3\frac{2}{5}$	_____
11.	_____	.28	23.	_____	18.8
12.	_____	3.6	24.	_____	11.5



A GARDEN PARTY

1. Miss Allen bought 36 Japanese lanterns to use at the sixth grade garden party. She paid \$6.48 for them. What was the average price of each lantern? $\$6.48 \div 36 = ?$

$$\begin{array}{r} \$.18 \\ 36 \overline{) \$6.48} \\ \underline{36} \\ 288 \\ \underline{288} \\ 0 \end{array}$$

You have already learned how to divide dollars and cents by whole numbers. There is nothing new in this problem. Why is the decimal point placed as it is in the quotient?

The average price of each lantern was \$.18.

2. All the sixth grade boys and girls wore paper hats at the garden party. Miss Allen bought 48 hats for \$3.84. All hats were the same price. What was the cost of each hat? $\$3.84 \div 48 = ?$

$$\begin{array}{r} \$.08 \\ 48 \overline{) \$3.84} \\ \underline{384} \\ 0 \end{array}$$

Why is the zero in the quotient? See if the problem checks. Each paper hat cost \$.08.

Write the decimal point in the quotient over the decimal point in the dividend. Then divide. If there is a remainder, write zeros in the dividend.

1. Dick's father is a druggist. He let Dick have six gallons of ice cream for the garden party for only \$8.25. What price did this average for a gallon? Carry the quotient to 3 decimal places. $\$8.25 \div 6 = ?$

$\begin{array}{r} \$1.375 \\ 6 \overline{) \$8.250} \end{array}$
--

Why is there a zero in the dividend?

Check by multiplying.

How can you round this answer?

The price was \$1.38 a gallon.

Write the quotients on your paper.

2. $3 \overline{) 9.6}$ $2 \overline{) .6}$ $5 \overline{) .65}$ $6 \overline{) 12.6}$ $5 \overline{) .15}$

3. $3 \overline{) .09}$ $4 \overline{) .008}$ $7 \overline{) .98}$ $5 \overline{) 1.5}$ $3 \overline{) 6.003}$

Divide and check.

4. $9 \overline{) .1197}$ $6 \overline{) 12.684}$ $14 \overline{) .308}$ $21 \overline{) 96.6}$ $7 \overline{) 15.127}$

5. $12 \overline{) 4.702}$ $33 \overline{) 3.366}$ $45 \overline{) .585}$ $67 \overline{) 46.9}$ $35 \overline{) .0245}$

Divide. Write zeros in the dividend.

6. $8 \overline{) 2.}$ $25 \overline{) 4.}$ $15 \overline{) 1.8}$ $16 \overline{) 8.}$ $8 \overline{) 6.2}$

7. $4 \overline{) 27.}$ $14 \overline{) 6.3}$ $25 \overline{) 8.}$ $28 \overline{) 14.}$ $50 \overline{) 20.}$

Divide to three decimal places in the quotient.

8. $23 \div 15 =$ $7.2 \div 31 =$ $11 \div 54 =$ $3.7 \div 26 =$

9. $2.1 \div 19 =$ $5.5 \div 20 =$ $8.9 \div 44 =$ $.79 \div 65 =$

Round the quotients at two decimal places. To do this how many decimal places will you need?

10. $\$17. \div 9 =$ $17.1 \div 14 =$ $3.8 \div 24 =$ $51 \div 42 =$

11. $7 \div 60 =$ $91 \div 73 =$ $58 \div 13 =$ $6 \div 38 =$



HOW MANY MILES TO A GALLON?

1. Fred's father made an automobile trip of 130.9 miles on 8.5 gallons of gasoline. How many miles did he average on one gallon of gasoline? $130.9 \div 8.5 = ?$

What is new here? It is a **decimal in the divisor** that is new.

Before this, all your divisors were whole numbers. Your division examples in decimals before today have been like the following:

$$23 \overline{)48.3}$$

$$11 \overline{)3.74}$$

$$52 \overline{)13.00}$$

Now you have this example: $8.5 \overline{)130.9}$

The question is how to handle the divisor, which is 8.5.

By moving the decimal points, we can change this example into an example like the ones you have had.

We change $8.5 \overline{)130.9}$

to $85. \overline{)1309.}$

We do this by multiplying both dividend and divisor by 10. How do we know this is correct?

The next page tells you how we know.

120 Dividing a Decimal by a Decimal

It is correct to change $8.5 \overline{)130.9}$ to $85. \overline{)1309.}$, for when you multiply both dividend and divisor by the same number, you do not change the quotient.

Take the example: $5 \overline{)25}$

Now multiply both dividend and divisor by 10 and it becomes: $50 \overline{)250}$

The answer is the same for both examples.

So we change an example like $3.3 \overline{)6.6}$
into the example $33. \overline{)66}$

We change an example like $2.25 \overline{)4.50}$
into an example like $225. \overline{)450.}$

In the last example we multiplied both dividend and divisor by 100.

If the divisor is a decimal, move the decimal point enough places to the right to make the divisor a whole number. Move the decimal point in the dividend the same number of places to the right.

Read the problem again about Fred's father and his auto trip. Now let us solve it.

$$\begin{array}{r} 15.4 \\ 85 \overline{)1309.0} \end{array}$$

Make 8.5 a whole number by multiplying by 10. The new divisor is then 85.

Multiply the dividend by 10.

The new dividend is 1309.

Divide as you have done before.

Fred's father averaged 15.4 miles on a gallon of gasoline.

Divide and check. Remember to move the decimal points in divisor and dividend.

1. $.11 \overline{)1.32}$

$.9 \overline{)81.9}$

$.8 \overline{)1.856}$

2. $.05 \overline{).45}$

$.4 \overline{)3.248}$

$.06 \overline{).366}$

3. $1.8 \overline{)1.08}$

$.33 \overline{).132}$

$2.6 \overline{)20.8}$

4. $.2 \overline{).0554}$

$.03 \overline{).0366}$

$.04 \overline{).50}$

Divide and check. Remember to move the decimal points.

5. $.8 \overline{).50}$

$.08 \overline{).12}$

$.7 \overline{).14}$

6. $.4 \overline{)9.324}$

$1.2 \overline{)10.8}$

$.6 \overline{)78.48}$

7. $.9 \overline{)7.47}$

$2.4 \overline{).96}$

$.45 \overline{).0135}$

8. $3.7 \overline{)46.62}$

$6.02 \overline{)78.26}$

$3.06 \overline{)11.934}$

9. $.05 \overline{).15}$

$.08 \overline{)32.096}$

$2.1 \overline{)116.64}$

10. The socks that Ben wants cost \$.35 a pair. How many pairs can he buy for \$1.75?

11. In 1934 Francisco Agello broke the airplane speed record by going 440.67 miles an hour. At this rate how long would it take an airplane to cross the Atlantic Ocean from Ireland, a distance of 1900 miles?

A SHORTER WAY

Here is a shorter way to divide by a decimal. Let us take the same problem about Fred's father.

1. Fred's father made an automobile trip of 130.9 miles on 8.5 gallons of gasoline. How many miles did he average on one gallon? $130.9 \div 8.5 = ?$

$$\begin{array}{r} 15.4 \\ 8.5 \overline{) 130.9\underset{\wedge}{0}} \end{array}$$

Do not move the decimal points. Put a caret (\wedge) in the dividend where the decimal point would go if moved.

Place decimal point in quotient above the caret.

Divide as you have done before.

The average was 15.4 miles on a gallon.

2. Howard earns \$.012 on every daily paper he sells. Last week he earned \$4.80. How many papers did he sell? $\$4.80 \div .012 = ?$

$$\begin{array}{r} 400. \\ .012 \overline{) 4.800\underset{\wedge}{0}} \end{array}$$

Put a caret in dividend where decimal point would go if moved.

Write 0's to make enough places. Place decimal point above caret.

Howard sold 400 papers last week.

To divide by a decimal, count the number of decimal places in the divisor. Put a caret in the dividend as many places to the right of the decimal point as there are decimal places in the divisor. Add decimal zeros if you need them. Write the decimal point in the quotient just above the caret in the dividend. Divide as by a whole number.

In the following examples, the caret has been placed in the dividend, and the decimal point in each quotient. Finish the division on your paper and check your work.

- | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. $.4 \overline{)8.4}_{\wedge}$ | 5. $.5 \overline{)25.6}_{\wedge} 5$ | 4. $.4 \overline{)12.4}_{\wedge}$ | 3. $.3 \overline{)9}_{\wedge}$ |
| 2. $.9 \overline{).0}_{\wedge} 018$ | 12. $.12 \overline{)1.44}_{\wedge}$ | 5. $.5 \overline{)1.5}_{\wedge}$ | 07. $.07 \overline{)1.54}_{\wedge}$ |
| 3. $.8 \overline{)4.8}_{\wedge}$ | 15. $.15 \overline{)6.00}_{\wedge}$ | 05. $.05 \overline{)4.00}_{\wedge}$ | 04. $.04 \overline{)4.32}_{\wedge}$ |

The division has been done in the examples below, but the carets and decimal points have not been placed. Copy the examples. Place carets in the dividends, and decimal points in the quotients. In which examples were decimal zeros needed in the dividend?

- | | | |
|---|--|---|
| 4. $\begin{array}{r} 271 \\ .2 \overline{)5.42} \end{array}$ | 6. $\begin{array}{r} 12 \\ .6 \overline{)7.2} \end{array}$ | 4. $\begin{array}{r} 11 \\ .4 \overline{)44} \end{array}$ |
| 5. $\begin{array}{r} 8 \\ .5 \overline{)4.0} \end{array}$ | 12. $\begin{array}{r} 40 \\ .12 \overline{)4.80} \end{array}$ | 16. $\begin{array}{r} 40 \\ .16 \overline{)6.40} \end{array}$ |
| 6. $\begin{array}{r} 51 \\ .005 \overline{)2.55} \end{array}$ | 013. $\begin{array}{r} 200 \\ .013 \overline{)2.600} \end{array}$ | 2. $\begin{array}{r} 3 \\ .2 \overline{)0.6} \end{array}$ |
| 7. $\begin{array}{r} 31 \\ 2.2 \overline{)68.2} \end{array}$ | 8. $\begin{array}{r} 1010 \\ .8 \overline{)808.0} \end{array}$ | 9. $\begin{array}{r} 942 \\ .9 \overline{)8478} \end{array}$ |
| 8. $\begin{array}{r} 11 \\ 3.15 \overline{)3465} \end{array}$ | 262. $\begin{array}{r} 110 \\ .262 \overline{)28820} \end{array}$ | 325. $\begin{array}{r} 3 \\ .325 \overline{)975} \end{array}$ |
| 9. $\begin{array}{r} 13 \\ .5 \overline{)065} \end{array}$ | 0111. $\begin{array}{r} 400 \\ .0111 \overline{)4400} \end{array}$ | 125. $\begin{array}{r} 2 \\ .125 \overline{)250} \end{array}$ |

124 Dividing Decimals of Many Kinds

In some of the following examples the divisor is a whole number. In these remember to place the decimal point in the quotient just above the decimal point in the dividend.

In some of the examples the divisor is a decimal. Remember in such examples to place the decimal point in the quotient just above the caret that you place in the dividend.

In all the examples, divide until there is no remainder. Add as many decimal zeros as you need.

1. $7.5 \div 50 = ?$

$7.48 \div .05 = ?$

2. $30 \div .04 = ?$

$286.2 \div 53 = ?$

3. $11.985 \div 17 = ?$

$1.334 \div .46 = ?$

4. $9 \div 1.6 = ?$

$722 \div 76 = ?$

5. $62.93 \div .031 = ?$

$2.4 \div 60 = ?$

$27 \div .15 = ?$

$14.28 \div 6.8 = ?$

$460 \div 2.3 = ?$

$.9064 \div .044 = ?$

$1710 \div 3.8 = ?$

$28.8 \div .018 = ?$

$.462 \div .084 = ?$

$71.5 \div 6.5 = ?$

$200 \div 8 = ?$

$86.76 \div .723 = ?$

6. Ellen's sister takes type-writing at high school. She has a speed of 75 words a minute. What is her speed by the second?

7. Mrs. Mills paid \$3.41 for gas used in January. What was the average cost of the gas each day during January.

8. In a spelling test of 50 words, Elsie missed 8. What part of the words did she miss? Write it in two ways.





A SCHOOL CARNIVAL

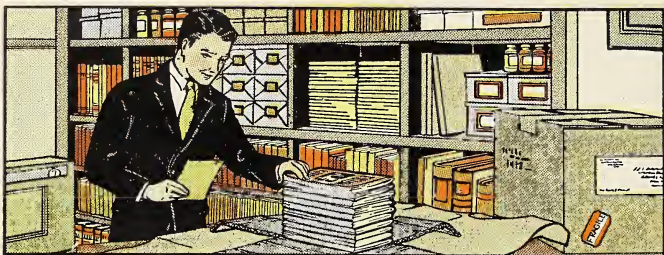
1. The Franklin school children had a carnival in June. They sold tickets at \$.15 each. How many tickets did they sell if their ticket sales amounted to \$114?

2. The sports committee bought 5 yards of blue ribbon for badges to give for the best stunts at the carnival. How many badges, 7.5 inches long, could they cut from the 5 yards of ribbon?

3. The ice cream committee were planning to fill a cone for each of 555 children. They found that they could fill 30 cones from 1 gallon of ice cream. How many gallons of ice cream did they need?

4. Louis won first prize in the harmonica contest. He was given a harmonica worth \$2.50 for the best 20-minute program of music. He said he was paid \$.____ a minute for having a good time.

5. After all expenses were paid, the Franklin school made \$247.05 on their carnival. This was given to athletics, dramatics, and the library in equal amounts. How much did each of the three receive?



SHORT WAYS OF DIVIDING DECIMALS

In multiplication of decimals you have found there are short ways of multiplying by 10, by 100, and by 1000. Here you will see that there are short ways of dividing by these same numbers.

1. The manager of the school store ordered 10 language books of one kind for the sixth grade. His bill amounted to \$6.80. What was the price of each book? $\$6.80 \div 10 = ?$

$\begin{array}{r} \$.68 \\ 10 \overline{) \$6.80} \end{array}$

In what way is the quotient like the dividend?

In what way is it different?

Can you see how to get the quotient without going through the work of dividing?

Each book cost \$.68.

Read these other numbers divided by 10.

2. $7.32 \div 10 = .732$ $.8 \div 10 = .08$ $.16 \div 10 = .016$

<p>To divide a number by 10, move its decimal point one place to the left.</p>
--

Some small seeds, like clover seed and timothy seed, are sold by the **hundredweight**, which means by the 100 pounds. Prices on such seeds, as well as on cattle, hogs, and sheep, are given by the hundred-weight.

1. If a farmer hauls a load of clover seed to market and finds that the seed weighs 1648 pounds, how many hundredweight will he have? $1648 \div 100 = ?$

$\begin{array}{r} 16.48 \\ 100 \overline{)1648.00} \end{array}$

In what way is the quotient like the dividend?

In what way is it different?

Can you see a short way of dividing by 100?

The farmer has 16.48 hundredweight of clover seed.

Here are numbers divided by 100. Read each example.

$$2. \quad 38.40 \div 100 = .384$$

$$18256 \div 100 = 182.56$$

$$457 \div 100 = 4.57$$

<p>To divide a number by 100, move its decimal point two places to the left.</p>
--

Divide by moving the decimal point.

$$3. \quad 56 \div 10 = ? \qquad 328 \div 10 = ? \qquad 5210 \div 10 = ?$$

$$4. \quad 33.12 \div 10 = ? \qquad 465 \div 100 = ? \qquad 2936 \div 100 = ?$$

$$5. \quad 256 \div 100 = ? \qquad 7.8 \div 10 = ? \qquad 29.8 \div 100 = ?$$

SHORT WAYS OF DIVIDING DECIMALS

Lumber is usually sold by the thousand feet. Prices on lumber are quoted per M., meaning per 1000 feet.

1. A carpenter needs 8500 feet of lumber. How many thousand feet does he need? What will the lumber cost him at \$48 per M.?

$$\begin{array}{r}
 8.5 \\
 1000 \overline{)8500.0} \\
 \underline{8000} \\
 5000 \\
 \underline{5000} \\
 0
 \end{array}$$

In what way is the quotient like the dividend?

In what way is it different? Can you see how to divide by 1000, without doing any real dividing?

The carpenter needs 8.5 M. feet of lumber.

He will pay $8.5 \times \$48$. How much will he pay?

Other numbers divided by 1000:

$$6340 \div 1000 = 6.34$$

$$\$67.50 \div 1000 = \$.0675$$

To divide a number by 1000 move its decimal point three places to the left. Put zeros before the number if needed.

Divide by moving the decimal point.

$$2. \quad 3.08 \div 10 = \quad 23.1 \div 10 = \quad 71.14 \div 100 =$$

$$3. \quad 9257 \div 1000 = \quad 829 \div 1000 = \quad 28 \div 100 =$$

$$4. \quad 73.4 \div 1000 = \quad 65 \div 1000 = \quad 39.19 \div 1000 =$$

$$5. \quad 5.68 \div 1000 = \quad 2.12 \div 100 = \quad 9.2 \div 100 =$$

FINDING OUR WEAK SPOTS

This is a test to show how well you can divide decimals. Your teacher will give you time to try all the examples. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her in order to find out what the trouble is.

Division**A Decimal by a Whole Number**

- | | | | |
|-----------------------|--------------------|----------------------|----------------------|
| 1. $2\overline{)2.6}$ | $2\overline{)3.6}$ | $5\overline{)15.45}$ | $7\overline{)25.41}$ |
| 2. $3\overline{).9}$ | $4\overline{).52}$ | $6\overline{).780}$ | $12\overline{)2.4}$ |
| 3. $1\overline{).1}$ | $2\overline{).02}$ | $4\overline{).280}$ | $8\overline{).64}$ |

A Whole Number by a Whole Number

- | | | | |
|---------------------|-------------------|--------------------|--------------------|
| 4. $6\overline{)3}$ | $5\overline{)4}$ | $66\overline{)33}$ | $25\overline{)60}$ |
| 5. $2\overline{)1}$ | $12\overline{)6}$ | $10\overline{)5}$ | $30\overline{)3}$ |

A Whole Number by a Decimal

- | | | | |
|----------------------|--------------------|---------------------|---------------------|
| 6. $.4\overline{)8}$ | $.3\overline{)45}$ | $.07\overline{)35}$ | $.09\overline{)45}$ |
| 7. $.1\overline{)1}$ | $.2\overline{)4}$ | $.7\overline{)14}$ | $.01\overline{)1}$ |

A Decimal by a Decimal

- | | | | |
|----------------------------|-------------------------|-------------------------|----------------------|
| 8. $.5\overline{).55}$ | $.4\overline{)1.6}$ | $.24\overline{).48}$ | $1.3\overline{)4.2}$ |
| 9. $.125\overline{)6.25}$ | $3.14\overline{)18.84}$ | $45.5\overline{)31.85}$ | |
| 10. $.125\overline{)1.25}$ | $6.25\overline{)31.25}$ | $2.25\overline{)1.35}$ | |

CURING OUR WEAK SPOTS

If you made mistakes in any row of the test on page 129, do the examples in the row of the same number on this page.

Division

A Decimal by a Whole Number

- | | | | |
|-----------------------|---------------------|----------------------|----------------------|
| 1. $2\overline{)4.8}$ | $4\overline{)5.6}$ | $6\overline{)18.96}$ | $9\overline{)48.33}$ |
| 2. $2\overline{).8}$ | $5\overline{).65}$ | $8\overline{).656}$ | $16\overline{)3.2}$ |
| 3. $8\overline{).64}$ | $4\overline{).280}$ | $1\overline{).1}$ | $2\overline{).02}$ |

A Whole Number by a Whole Number

- | | | | |
|----------------------|------------------|--------------------|---------------------|
| 4. $4\overline{)2}$ | $6\overline{)5}$ | $88\overline{)44}$ | $30\overline{)102}$ |
| 5. $10\overline{)5}$ | $2\overline{)1}$ | $30\overline{)3}$ | $12\overline{)6}$ |

A Whole Number by a Decimal

- | | | | |
|-----------------------|--------------------|---------------------|---------------------|
| 6. $.3\overline{)9}$ | $.4\overline{)56}$ | $.06\overline{)42}$ | $.08\overline{)64}$ |
| 7. $.7\overline{)14}$ | $.01\overline{)1}$ | $.2\overline{)4}$ | $.1\overline{)1}$ |

A Decimal by a Decimal

- | | | | |
|-----------------------------|-------------------------|-------------------------|----------------------|
| 8. $.4\overline{).44}$ | $.5\overline{)1.5}$ | $.36\overline{).72}$ | $1.5\overline{)7.5}$ |
| 9. $.112\overline{)4.48}$ | $2.12\overline{)14.84}$ | $26.5\overline{)13.25}$ | |
| 10. $6.25\overline{)31.25}$ | $4.35\overline{)3.48}$ | $.125\overline{)1.25}$ | |



BUYING AND SELLING

1. A farmer sold a load of calves when the price was \$11.28 a hundredweight. At that rate what was the price a pound?

2. When the market price of clover seed is \$16.96 a hundredweight, what price is this a pound?

3. A lumber dealer receives an order for 4560 feet of lumber. For how many thousand feet does he figure the bill?

4. Ten pounds of flour cost \$.36. What is the cost for each pound?

5. A load of wheat weighs 6370 pounds. This is equal to how many hundredweight?

6. Mrs. Nelson bought a 10-pound turkey for \$4.20. What was the price of the turkey a pound?

7. How many thousand feet of lumber in 3180 feet?

8. A grain buyer ships a carload of timothy seed, the weight of the seed being 16,970 pounds. Find how many hundredweight in the shipment.

9. What will be the cost of 1860 feet of flooring at \$96 per M.?

WINNERS' PAGE

For the pupils who made no mistakes on pages 129 and 130.

1. During the World War, flour cost \$7.20 a hundredweight. What price was that for one pound?

2. Mr. White sold beef cattle weighing 5874 pounds when the price was \$7.70 a hundredweight. What should he receive for the cattle?

3. A 10-yard bolt of ribbon is marked \$2.95. At this rate what is the price of one yard?



4. Robert bought 675 pounds of cracked corn to use for chick feed. He paid \$1.15 a hundredweight. How much did he pay for the corn?

5. Find the cost of shipping 576 pounds of furniture, if the freight rate is \$.57 a hundred pounds.

6. A hundred-pound bag of flour costs \$3.90. At that rate what is the cost of 35 pounds?

7. A farmer sold 3265 pounds of clover seed at \$15.20 a hundredweight. What was the amount of the check he should have received?

8. A coal dealer is selling small lots of coal by the hundredweight instead of by the ton. What should he charge for 1200 pounds, if his price is \$.96 a hundredweight?

9. Paul's expenses for 10 weeks at a summer camp were \$195. How much did his expenses average for one week?

ESTIMATING ANSWERS

This test will help you find out how closely you can estimate or judge the answers to problems. Your teacher will give you time to do your best. Write the answers on your paper.

Read each problem carefully, then write the best estimate of the answer among the four answers given.

1. What is $\frac{1}{3}$ of \$9.75?

- (a) \$9.75 (b) \$27.44 (c) \$3.30 (d) \$2.50

2. If the erasers used in a school cost \$.66 a dozen, how much did they cost apiece?

- (a) 50¢ (b) 15¢ (c) 5¢ (d) 85¢

3. How many pieces of cloth each $\frac{1}{2}$ yd. long can be cut from a piece of cloth 4 yd. long?

- (a) $4\frac{1}{2}$ pieces (b) $3\frac{3}{4}$ pieces (c) 16 pieces (d) 8 pieces

4. Sara has two pieces of gingham to use in making an apron. One piece is $1\frac{1}{4}$ yd. long and the other is $1\frac{1}{2}$ yd. long. Her pattern calls for 3 yd. How much more cloth does she need?

- (a) 1 yd. (b) 2 yd. (c) $2\frac{3}{4}$ yd. (d) $\frac{1}{4}$ yd.

5. Clem shoveled snow for $3\frac{1}{2}$ hr. on Monday, $2\frac{1}{2}$ hr. on Tuesday, and $1\frac{1}{4}$ hr. on Wednesday. How many hours did he shovel snow in the three days?

- (a) 5 hr. (b) 7 hr. (c) 10 hr. (d) 9 hr.

6. What is the sum of 475, 225, $20\frac{1}{2}$, and 5?

- (a) 400 (b) 625 (c) 725 (d) 800

If you made mistakes in this test, try to make yourself better at estimating answers. After getting an answer for a problem, always ask yourself if the answer seems reasonable.

SOLVING PROBLEMS WITHOUT NUMBERS

This test will help you find out how well you understand number relations or see through hard parts of problems. Your teacher will give you time to do your best. Write the answers on your paper.

Read each question carefully, then write whether you would add, subtract, multiply, or divide.

1. If you know the length of anything in feet, how do you find its length in inches?

2. If you know how many oranges are in a crate, how do you find the number of dozen oranges there are?

3. If you know the number of miles a car was driven and the number of gallons of gasoline used, how do you find the average number of miles the car went on one gallon?

4. Frank knows how much the dues are for each club member. He also knows the number of members. How could he find what the club will get from dues if all members pay?

5. Kate knew how many miles she had to go when she started the day's drive. At noon she knew how many miles she had gone. How could she find how many miles she had yet to go?

6. Henry knows how many sandwiches were brought to the picnic. He also knows how many persons came. What should he do to find the number of sandwiches for each person, if all get the same number?

If you made mistakes in this test, you are having trouble with the question, "What is to be done?" In your next problems give more time to this question.



ARNOLD AND HIS BICYCLE

You have been learning how to add, subtract, multiply, and divide decimals. Now we shall see if you know which of these to do in solving a problem. Use short methods whenever you can. Remember that the decimal points are very important.

1. When Arnold got a job as errand boy at the drug store, his father offered to buy the things he needed for his bicycle. Arnold decided on a carrier for \$1.30; a "bike-light" for \$1.55; a parking stand for \$.39; and a siren for \$.78. How much did these cost?

2. Look at problem 1. How much more did Arnold have to pay for the carrier than for the siren? The cost of the parking stand was how much less than the cost of the light?

3. A one-way railroad fare between Chicago and Blue Island is \$.33. A 10-ride ticket costs \$2.38. How much can a person save on each ride by buying a 10-ride ticket?

USING DECIMALS IN MANY WAYS

1. A British bushel measure is nearly equal to 1.0321 of a United States bushel. About how many United States bushels are there in 15 British bushels?

2. Two sixth grade classes took a test in decimals and compared their scores. The average score for one class was 79.45, and for the other class, 80.1. What was the difference in their average scores?

3. When Mr. Drew started on his summer vacation, his automobile speedometer read 7003.8 miles. The day he returned from his vacation, it read 9807.1 miles. How many miles did his car run during the vacation?

4. An American traveler in Russia asked the distance between two villages and was told it was 34 versts. How many miles was it? (A verst equals .663 miles.)

5. The airship Los Angeles flew across the ocean from Germany to New Jersey, a distance of 5066 miles, in $81\frac{1}{4}$ hours. What was its average speed an hour? (Write $81\frac{1}{4}$ as a decimal. Carry the answer to 2 decimal places.)

6. With the money the sixth grade children earned during Book Week, they bought four new library books: "Skyward," \$.89; "How They Carried the Mail," \$2.68; "Life on the Mississippi," \$2.00; and "The Story of Science," \$1.79. After paying for the books, they had \$.37 left. How much money had they earned?

FOR THOSE WHO NEED THEM

Do you still have trouble with decimals in solving problems? The exercises here and on the next page will help you to be strong no matter what kind of problems in decimals you have.

Add and check.

1. $2.31 + 5 + 21.231 = ?$ $3.56 + 1.4 + 6.01 = ?$
 $5.231 + 12.108 + 21.237 + 5.007 = ?$
2. $2.3 + 1.2 + 3.3 = ?$ $4.1 + 1.5 + 2.3 = ?$
 $.9 + .7 + .3 = ?$
3. $.5 + .8 + .7 = ?$ $.36 + .37 + .64 = ?$
 $.05 + .02 + .02 = ?$

Some harder additions.

4. $.28 + 3.7 + .08 + 19.1 + 10.1 = ?$
5. $7 + 9.8 + 11.1 + .07 + 3.3 = ?$
6. $1.3 + .09 + 124.5 + .17 = ?$
7. $.1 + .01 + 1 + 1.01 + 1.1 = ?$
8. $3 + .3 + 10 + 2.6 + .81 + 5.3 = ?$
9. $89.7 + 103 + 20.06 + .04 + .9 = ?$

Subtract and check.

10. $.6 - .107 = ?$ $.6 - .009 = ?$
 $.5 - .495 = ?$ $.6 - .552 = ?$
11. $8 - 2.7 = ?$ $23 - 19.6 = ?$
 $28.3 - 5.9 = ?$ $89.2 - 37.05 = ?$
12. Subtract .3 from .58 Subtract .5 from .62

138 Many Kinds of Examples in Decimals

Some harder subtractions.

$$\begin{array}{ll} 13. & 29.3 - 7.235 = ? \qquad 67.09 - 19.19 = ? \\ & 97.6 - 4.9067 = ? \end{array}$$

$$\begin{array}{ll} 14. & 625.83 - 500 = ? \qquad 1000 - 531.008 = ? \\ & 607 - 31.0309 = ? \end{array}$$

$$\begin{array}{ll} 15. & 569.7 - 252.735 = ? \qquad 5409 - 3999.006 = ? \\ & 6976.05 - 5000 = ? \end{array}$$

Multiply and check.

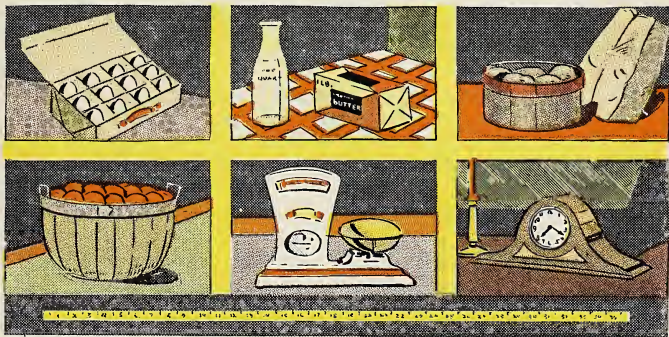
$$\begin{array}{ll} 16. & .6 \times 6.5 = ? \qquad 5 \times 7.8 = ? \\ & .5 \times 76 = ? \qquad .7 \times 50 = ? \\ 17. & 7.8 \times 25 = ? \qquad .3 \times .3 = ? \\ & 5.6 \times 7.5 = ? \qquad 4.8 \times 1.5 = ? \\ 18. & 10 \times .57 = ? \qquad 10 \times .81 = ? \\ & 100 \times .72 = ? \qquad \frac{3}{5} \text{ of } 1.5 = ? \\ 19. & 3.6 \times 55 = ? \qquad 10 \times 3.7 = ? \\ & \frac{5}{6} \times 7.2 = ? \qquad .05 \times .05 = ? \end{array}$$

Divide and check.

$$\begin{array}{ll} 20. & .045 \div 9 = ? \qquad 3.6 \div 72 = ? \\ & 17 \div 34 = ? \qquad 15 \div 60 = ? \\ 21. & 4.8 \div .4 = ? \qquad 18 \div .6 = ? \\ & 4.8 \div .12 = ? \qquad 10.28 \div 1.38 = ? \\ 22. & 29.91 \div .7 = ? \qquad 7.8 \div 19 = ? \\ & 18.84 \div 3.14 = ? \qquad 16.52 \div .4 = ? \end{array}$$

CHAPTER IV

MEASURING IN EVERYDAY LIFE



HOW WE MEASURE THINGS

Bob has been studying arithmetic and knows that people measure most things in one way or another.

1. He buys eggs and butter. The grocer has the eggs in boxes each holding a dozen, and the butter in pound bricks. How many eggs are in a dozen and how many ounces are in a pound?

2. The milkman leaves a quart of milk each morning. Bob knows how many pints there are in a quart and how many quarts there are in a gallon. How many pints are there in a quart? How many quarts are there in a gallon?

3. What is the number of quarts in a peck? The number of pecks in a bushel? Bob knows a bushel basket when he sees one. Do you?

FIND THE ONES YOU DON'T KNOW

When we are writing and reading measures, we need to know that there are short ways of writing the names of measures, called abbreviations. For example,

For **pint** or **pints** we write **pt.**

For **quart** or **quarts** we write **qt.**

For **gallon** or **gallons** we write **gal.**

Number your paper from 1 to 18. Write the abbreviations for as many of the following names of measures as you can. In each case write one abbreviation for both singular and plural.

1. dozen or dozens _____	10. pound or pounds _____
2. peck or pecks _____	11. ton or tons _____
3. bushel or bushels _____	12. second or seconds _____
4. inch or inches _____	13. minute or minutes _____
5. foot or feet _____	14. hour or hours _____
6. yard or yards _____	15. day or days _____
7. rod or rods _____	16. week or weeks _____
8. mile or miles _____	17. month or months _____
9. ounce or ounces _____	18. year or years _____

In this book the same abbreviation is used for one or for more than one.

CATCHING UP WITH BOB

Can you say these exercises without looking at your tables? Look at the tables in the back of the book if you must.

- | | |
|-----------------------------------|------------------------------------|
| 1. 1 doz. = ____ things | 16. 24 ft. = ____ yd. |
| 2. 1 score = ____ things | 17. 1 mi. = ____ ft. |
| 3. 36 units = ____ doz. | 18. 1 lb. = ____ oz. |
| 4. 4 pt. = ____ qt. | 19. 32 oz. = ____ lb. |
| 5. 4 qt. = ____ gal. | 20. $\frac{1}{2}$ lb. = ____ oz. |
| 6. 5 gal. = ____ qt. | 21. 1 T. = ____ lb. |
| 7. 1 bu. = ____ pk. | 22. 1 min. = ____ sec. |
| 8. $2\frac{1}{2}$ bu. = ____ pk. | 23. 2 hr. = ____ min. |
| 9. 8 pk. = ____ bu. | 24. $\frac{1}{2}$ hr. = ____ min. |
| 10. 1 ft. = ____ in. | 25. 24 mo. = ____ yr. |
| 11. 24 in. = ____ ft. | 26. $\frac{1}{2}$ yr. = ____ mo. |
| 12. $1\frac{1}{2}$ ft. = ____ in. | 27. 2 wk. = ____ da. |
| 13. 1 yd. = ____ ft. | 28. 120 sec. = ____ min. |
| 14. 36 in. = ____ yd. | 29. $\frac{1}{4}$ min. = ____ sec. |
| 15. 2 yd. = ____ in. | 30. 2 mo. = ____ yr. |

MEASURING THINGS IN THE SCHOOLROOM

We shall now see who are good at estimating length. You will estimate the length, width, or height of things before measuring them.

Here are the problems. Number your paper from 1 to 7. Write your answer for each problem. Do not use fractions of units.

After the answers are written, you and your teacher will measure the things and find out who are the best estimators.

1. How many inches long is your arithmetic book?
2. How many inches wide is it?
3. Estimate the height of a schoolroom door in feet. You should all measure the same door. How many inches wide is this door?
4. How many feet long is the top of your teacher's desk?
5. How many inches long is the top of a pupil's desk in your room? All use the same desk.
6. Estimate the length of the schoolroom floor in feet.
7. How many yards long is your longest piece of blackboard?

GEORGE'S HEIGHT AND AGE

1. George is 4 ft. 3 in. in height. What is his height in inches? 4 ft. 3 in. = ____ in.?

$$1 \text{ ft.} = 12 \text{ in.}$$

←Inches in 1 ft.

$$4 \text{ ft.} = 4 \times 12 \text{ in.} = 48 \text{ in.}$$

←Inches in 4 ft.

$$4 \text{ ft. 3 in.} =$$

←Inches in 4 ft. 3 in.
George's height is 51 in.

$$48 \text{ in.} + 3 \text{ in.} = 51 \text{ in.}$$

2. George is 11 yr. 4 mo. old. What is his age in months? 11 yr. 4 mo. = ____ mo.

$$1 \text{ yr.} = 12 \text{ mo.}$$

←Months in 1 yr.

$$11 \text{ yr.} = 132 \text{ mo.}$$

←Months in 11 yr.

$$132 \text{ mo.} + 4 \text{ mo.} = 136 \text{ mo.}$$

←Months in 11 yr. 4 mo.

←George is 136 mo. old.

How many:

3. Quarts in 3 gal. 3 qt.?

7. Pecks in $2\frac{1}{4}$ bu.?

4. Inches in 3 ft. 4 in.?

8. Feet in $2\frac{1}{3}$ yd.?

5. Ounces in 12 lb. 3 oz.?

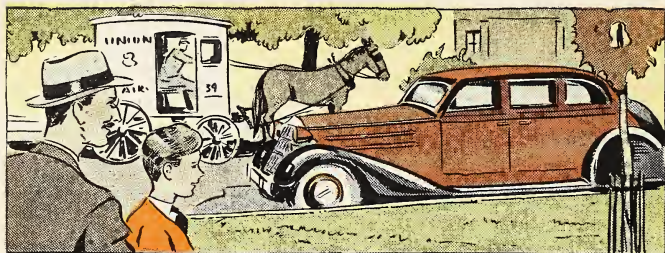
9. Inches in $1\frac{1}{2}$ yd.?

6. Days in 3 wk. 6 da.?

10. Things in $8\frac{1}{3}$ doz.?

Large Words Used in Measures

Numbers like 3 gal. or 2 bu. are called **denominate numbers**. Numbers like 3 wk. 6 da. or 12 lb. 3 oz. are **compound denominate numbers**. You have been working with compound denominate numbers. If one measure is written in two or more units like pounds and ounces, it is a compound denominate number. Finding how many quarts there are in 3 gal. 3 qt. is called **changing**, or **reducing**, 3 gal. 3 qt. to quarts. This is called **reduction**.



SOMETHING NEEDED EVERY DAY

1. Robert's father has a car with a wheel base 121 in. long. How many feet and inches is this? (Wheel base is a measure of car length.) $121 \div 12 = ?$

$$12 \text{ in.} = 1 \text{ ft.}$$

$$\begin{array}{r} 10 \\ 12 \overline{)121} \\ \underline{12} \\ 1 \end{array}$$

←12 in. make 1 ft.

←121 in. make 10 ft. 1 in.

The wheel base is 10 ft. 1 in.

2. Joe, the milkman, has 135 qt. of milk on his wagon. How many gallons has he? Write the remainder as a fraction of a gallon. $135 \div 4 = ?$

Change these measures on your paper.

3. 125 ft. = ____ yd. ____ ft.

4. 43 da. = ____ wk. ____ da.

5. 27 oz. = ____ lb. ____ oz.

6. 100 in. = ____ ft. ____ in.

7. 87 hr. = ____ da. ____ hr.

8. 50 units = ____ doz. ____ units.



MR. COLBERT'S POTATOES AND APPLES

We shall now learn how to add compound denominate numbers.

1. Mr. Colbert has two boxes for potatoes in his cellar. In one box he has 3 bu. 2 pk. and in the other 5 bu. 1 pk. How many potatoes are in the two boxes? 3 bu. 2 pk. + 5 bu. 1 pk. = ?

3 bu. 2 pk.

5 bu. 1 pk.

8 bu. 3 pk.

←Place bushels under bushels and pecks under pecks.

←Add the pecks. Add the bushels.

There are 8 bu. 3 pk. in the 2 boxes.

Add the following.

2. 4 gal. 1 qt.

5 gal. 2 qt.

4. 3 wk. 4 da.

5 wk. 2 da.

3. 7 ft. 4 in.

8 ft. 7 in.

5. 2 hr. 35 min.

2 hr. 15 min.

6. Mr. Colbert has also two bags of apples in his cellar. One bag has 1 bu. 3 pk. in it and the other has 1 bu. 2 pk. How many apples are in the two bags? $1 \text{ bu. } 3 \text{ pk.} + 1 \text{ bu. } 2 \text{ pk.} = ?$

1 bu. 3 pk.
1 bu. 2 pk.
<hr/> 2 bu. 5 pk.
or
3 bu. 1 pk.

←Place bushels under bushels and pecks under pecks.

←Add pecks. Add bushels.

But 5 pk. = 1 bu. 1 pk.

←So 2 bu. 5 pk. = 3 bu. 1 pk.

There are 3 bu. 1 pk. in the 2 bags.

Reduce your answer to its simplest form. For example, if your answer comes out 6 bu. 4 pk. you should write it 7 bu. If it comes out 2 ft. 14 in., you should write it 3 ft. 2 in.

Add the following.

$$\begin{array}{r} 7. \quad 2 \text{ gal. } 3 \text{ qt.} \\ \quad \underline{5 \text{ gal. } 3 \text{ qt.}} \end{array}$$

$$\begin{array}{r} 10. \quad 5 \text{ lb. } 2\frac{1}{2} \text{ oz.} \\ \quad \underline{15 \text{ lb. } 15 \text{ oz.}} \end{array}$$

$$\begin{array}{r} 8. \quad 9 \text{ ft. } 10 \text{ in.} \\ \quad \underline{22 \text{ ft. } 4 \text{ in.}} \end{array}$$

$$\begin{array}{r} 11. \quad 21 \text{ bu. } 3 \text{ pk.} \\ \quad \underline{5 \text{ bu. } 2 \text{ pk.}} \end{array}$$

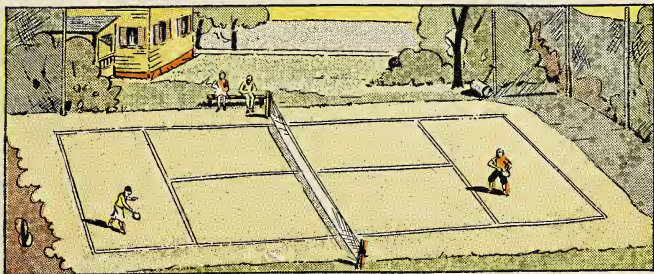
$$\begin{array}{r} 9. \quad 4 \text{ yr. } 5 \text{ mo.} \\ \quad \underline{12 \text{ yr. } 8 \text{ mo.}} \end{array}$$

$$\begin{array}{r} 12. \quad 8 \text{ yd. } 2\frac{1}{2} \text{ ft.} \\ \quad \underline{16 \text{ yd. } 2 \text{ ft.}} \end{array}$$

Add.

$$13. \quad 5 \text{ ft. } 3 \text{ in., } 7 \text{ ft. } 8 \text{ in., and } 9 \text{ ft. } 2 \text{ in.}$$

$$14. \quad 1 \text{ hr. } 45 \text{ min., } 2 \text{ hr. } 38 \text{ min., and } 4 \text{ hr. } 22 \text{ min.}$$



ALFRED'S TENNIS COURT

1. Alfred has a tennis court in his back yard. The court is 78 ft. long and 27 ft. wide. What is its perimeter, that is, the distance around it?

The distance around his court is 78 ft. + 27 ft. + 78 ft. + 27 ft. How many feet is the perimeter? Can you find it in another way?

2. How many yards in the perimeter of his court?

3. Alfred wants to buy tape to take the place of chalk lines. How much will it cost to buy enough tape to go around the court at 5¢ a yard?

4. He also needs 42 feet of tape to go down through the middle of the court and two strips each 27 feet long to go from side to side. How many yards of tape will be needed for these inside lines?

5. How much will these inside strips cost at 5¢ a yard?

A rectangle has four sides and four right angles. On your paper make a diagram to show each of the rectangles below. Mark the length and width on each. Then find the perimeter.

6. 12 ft. 3 in. by 8 ft. 4 in. 7. 10.5 in. by 10.5 in.



WHAT IS THE DIFFERENCE IN HEIGHT?

1. Ida is 5 ft. 2 in. in height and Jean is 4 ft. 1 in. in height. Find how much taller Ida is than Jean.
 $5 \text{ ft. } 2 \text{ in.} - 4 \text{ ft. } 1 \text{ in.} = ?$

$$\begin{array}{r} 5 \text{ ft. } 2 \text{ in.} \\ 4 \text{ ft. } 1 \text{ in.} \\ \hline 1 \text{ ft. } 1 \text{ in.} \end{array}$$

←Place feet under feet and inches under inches.

←Subtract.

Ida is 1 ft. 1 in. taller than Jean.

2. Madge is 5 ft. 1 in. in height and Carolyn is 4 ft. 8 in. What is the difference in their heights?
 $5 \text{ ft. } 1 \text{ in.} - 4 \text{ ft. } 8 \text{ in.} = ?$

Write it this way:

$$\begin{array}{r} 5 \text{ ft. } 1 \text{ in.} \\ 4 \text{ ft. } 8 \text{ in.} \\ \hline 5 \text{ in.} \end{array}$$

←You cannot take 8 in. from 1 in.

Think it this way:

$$\begin{array}{r} 5 \text{ ft. } 13 \text{ in.} \\ 5 \text{ ft. } 8 \text{ in.} \\ \hline 5 \text{ in.} \end{array}$$

←Add 12 in. to 1 in.

←Add 1 ft. to 4 ft.

←Subtract.

The difference is 5 in.



3. At the market Mrs. Rogers is looking at two dressed chickens. One weighs 2 lb. 12 oz. and the other 4 lb. 3 oz. How much more does the large chicken weigh than the small one?

4. In the afternoon Charles is in school from 1:00 until 3:30 o'clock. How long is he in school in the afternoon? 3 hr. 30 min. — 1 hr. 0 min. = ?

5. During the morning Mr. Cook is in his office from 8:45 to 11:30 o'clock. How long is he in his office during the morning?

11 hr. 30 min. <u>8 hr. 45 min.</u>
--

11 hr. 90 min. <u>9 hr. 45 min.</u>
--

Subtract.

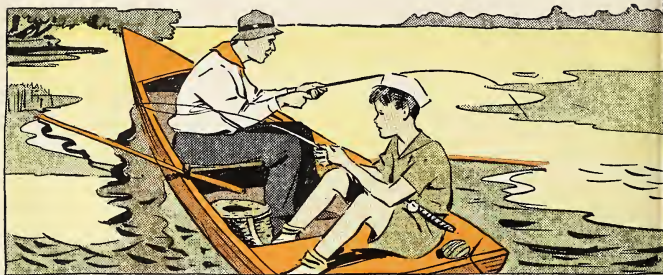
6.	11 wk. 3 da.
	<u>7 wk. 4 da.</u>

8.	12 hrs. 15 min.
	<u>9 hrs. 45 min.</u>

7.	5 gal. 1 qt.
	<u>3 gal. 2 qt.</u>

9.	30 ft. 6 in.
	<u>24 ft. 8 in.</u>

Adding equal amounts to both minuend and subtrahend does not change the difference.



FISHING AT INDIAN LAKE

1. Edward and his father were at Indian Lake from 5:35 A.M. until 12:15 P.M. How long was this?

2. They used live minnows for bait. They had $2\frac{1}{2}$ doz. shiners, 25 chubs, and 15 mud minnows. How many dozen and how many over did they have in all?

3. Edward had two fishing lines. His casting line was 25 yd. 1 ft. long and his drop line was 12 yd. $2\frac{1}{2}$ ft. long. How much longer was his casting line than his drop line?

4. When Edward let his drop line straight down from the top of the water, how far would the lower end of it be from the bottom of the lake, where the water was 40 ft. deep?

5. Edward's father caught three bass. They weighed 1 lb. 10 oz., 2 lb. 3 oz., and 2 lb. 8 oz. How much did the three bass weigh altogether?

6. Edward caught two pickerel. One weighed 4 lb. 7 oz. and the other 3 lb. 13 oz. How much did both of them weigh?

7. How much did all the fish weigh that Edward and his father caught on this trip?

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples in this test. If you make mistakes in any row, she will have you do others of the same kind in the row of the same number on the next page. Where you are having trouble, she will sometimes have you do the work out loud.

Write the abbreviations on your paper.

1. peck _____ yard _____ ounce _____ pound _____
2. bushels _____ inches _____ tons _____ feet _____

Copy and write the missing number.

3. 1 gal. = _____ qt. 1 mi. = _____ rd.
4. 1 gro. = _____ doz. 120 min. = _____ hr.
5. $\frac{1}{2}$ min. = _____ sec. 1 yr. = _____ da.

How many:

6. pints in 4 gal. 3 qt.? days in 4 wk. 3 da.?
7. gallons in 20 qt.? dozen in 108?

Add.

8. 5 gal. 3 qt. 6 gal. 2 qt. 1 pt.
1 gal. 3 qt. 2 gal. 3 qt. 1 pt.

Subtract.

9. 4 hr. 30 min. 6 hr. 35 min. 10 sec.
2 hr. 50 min. 3 hr. 40 min. 20 sec.

Find the perimeter of a rectangle:

10. (a) $5\frac{1}{2}$ feet long and $2\frac{1}{4}$ feet wide.
 (b) 15 feet 3 inches long and 6 feet 6 inches wide.

152 **Remedial Exercises in Adding and
Subtracting Measures**

CURING OUR WEAK SPOTS

Use these examples after the test on page 151.

Write the abbreviations on your paper.

1. gallon_____ dozen_____ mile_____ day_____
2. quart_____ minute_____ year_____ second_____

Copy and write the missing number.

3. 1 bu. = _____ pk. 144 things = _____ gross
4. 6 ft. = _____ yd. 1 T. = _____ lb.
5. 8 oz. = _____ lb. 24 in. = _____ ft.

How many:

6. pecks in 12 bu. 3 pk.? yards in 72 in.?
7. inches in 10 ft. 5 in.? pounds in 88 oz.?

Add.

8. 2 ft. 8 in. 6 yd. 2 ft. 7 in.
 4 ft. 8 in. 3 yd. 1 ft. 10 in.

Subtract.

9. 12 lb. 3 oz. 5 yd. 1 ft. 2 in.
 6 lb. 8 oz. 2 yd. 2 ft. 6 in.

Find the perimeter of a rectangle:

10. (a) $40\frac{1}{2}$ feet long and $6\frac{1}{4}$ feet wide.
 (b) 12 feet 4 inches long and 7 feet 2 inches wide.

Multiply.

1. $1\frac{1}{5} \times \frac{1}{5} = ?$

$\frac{7}{8} \times 2\frac{1}{2} = ?$

2. $5\frac{4}{5} \times 6\frac{1}{4} = ?$

$6\frac{1}{2} \times 2\frac{3}{4} = ?$

3. $65 \times .25 = ?$

$100 \times .75 = ?$

4. $.25 \times .25 = ?$

$.25 \times 2.5 = ?$

$2\frac{1}{4} \times \frac{1}{8} = ?$

$\frac{2}{3} \times 2\frac{2}{3} = ?$

$1\frac{3}{8} \times 7\frac{4}{5} = ?$

$20\frac{1}{4} \times 2\frac{1}{8} = ?$

$.45 \times 20 = ?$

$.625 \times 25 = ?$

$2.5 \times 2.5 = ?$

$2.5 \times .25 = ?$

Divide.

5. $\frac{1}{4} \div \frac{1}{2} = ?$

$\frac{6}{7} \div \frac{2}{3} = ?$

$\frac{1}{5} \div \frac{1}{10} = ?$

6. $2\frac{1}{2} \div \frac{1}{4} = ?$

$3\frac{3}{8} \div \frac{1}{8} = ?$

$3\frac{3}{4} \div 1\frac{1}{4} = ?$

7. $\frac{4}{5} \div \frac{1}{8} = ?$

$25\frac{3}{5} \div 6\frac{1}{4} = ?$

$5\frac{2}{3} \div 3\frac{1}{4} = ?$

8. $4 \overline{)1.68}$

$4 \overline{)16.8}$

$4 \overline{).168}$

9. $4 \overline{).0168}$

$.4 \overline{)1.68}$

$.4 \overline{)16.8}$

10. $.4 \overline{).168}$

$.04 \overline{)1.68}$

$.04 \overline{)168}$

Subtract.

11. $4\frac{1}{2} - 2\frac{1}{2} = ?$

$5\frac{2}{3} - 4\frac{1}{3} = ?$

12. $6\frac{1}{6} - 3\frac{5}{6} = ?$

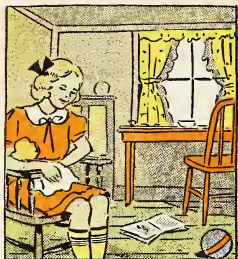
$11\frac{1}{5} - 2\frac{3}{5} = ?$

13. $10\frac{1}{5} - 5\frac{1}{10} = ?$

$7\frac{1}{2} - 4\frac{3}{8} = ?$

14. $8\frac{1}{9} - 6\frac{2}{3} = ?$

$15\frac{1}{4} - 8\frac{2}{3} = ?$

CHARLOTTE'S PLAYHOUSE

1. The floor of Charlotte's playhouse was 5 ft. 8 in. wide and 6 ft. long. She wanted two strips of flowered carpet, each 5 ft. 8 in. long and a yard wide, to cover the floor of the playhouse. How many yards of carpet should Charlotte buy?

$$\begin{array}{r} 5 \text{ ft. } 8 \text{ in.} \\ 2 \\ \hline 10 \text{ ft. } 16 \text{ in.} \end{array}$$

← Multiplicand

← Multiplier

← Multiply 8 in. by 2, and 5 ft. by 2.

or

$$\begin{array}{r} 11 \text{ ft. } 4 \text{ in.} \end{array}$$

← Reduce answer to simplest form.

or

$$\begin{array}{r} 3 \text{ yd. } 2 \text{ ft. } 4 \text{ in.} \end{array}$$

← Change to yards.

She should buy 3 yd. 2 ft. 4 in. of carpet.

Multiply.

$$\begin{array}{r} 2. \quad 8 \text{ ft. } 4 \text{ in.} \\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 5 \text{ gal. } 2 \text{ qt.} \\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 4 \text{ hr. } 30 \text{ min.} \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 8 \text{ bu. } 1 \text{ pk.} \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 1 \text{ lb. } 6 \text{ oz.} \\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 1 \text{ T. } 5 \text{ cwt.} \\ 6 \\ \hline \end{array}$$



EDITH AT THE STORE

1. For 25¢ Edith and her mother can buy 2 large cans of tomatoes. Each can contains 2 lb. 1 oz. How much is in the two cans?

2. For 25¢ they can buy 3 small cans of the same brand of tomatoes. Each small can contains 1 lb. 3 oz. How much is in three small cans?

3. Can they get more tomatoes by buying the two large cans or by buying the three small ones? How much more?

4. For 10¢ they can buy a large can of beets holding 1 lb. 12 oz. What is the weight of the beets they can buy for 50¢?

5. For 50¢ they can buy 6 small cans of the same brand of beets each weighing 1 lb. 4 oz. What is the weight of the beets in six small cans?

Have you seen cans of vegetables marked like this: **Net weight, 1 lb. 6 oz.** This tells you how much the vegetables weigh without the can.

JOE AT THE MEAT MARKET



1. Joe was buying a rolled roast at the market. It weighed 2 lb. 12 oz. The price was \$.24 a pound. What should he pay?

One Way

$$2 \text{ lb. } 12 \text{ oz.} = 2\frac{12}{16} \text{ lb.} = 2\frac{3}{4} \text{ lb.}$$

$$2\frac{3}{4} \times \$.24 = \$.66$$

Another Way

$$2 \text{ lb. } 12 \text{ oz.} = 2\frac{3}{4} \text{ lb.} = 2.75 \text{ lb.}$$

$$2.75 \times \$.24 = \$.66$$

2. What is the cost of 3 lb. 8 oz. of round steak at \$.28 a pound?

Find the cost of the following:

3. $2\frac{1}{2}$ doz. eggs at \$.32 a doz.
4. 2 lb. 4 oz. butter at \$.28 a pound.
5. 10 ft. 8 in. of insulated (covered) wire at 3¢ a foot.
6. 8 yd. 2 ft. of carpet at \$1.05 a yard.
7. 5 yd. 6 in. of silk at \$.84 a yard.
8. My car can go a mile in 1 min. 10 sec. How long at this rate will it take to go 17 miles?
9. Margaret needs 4 strips of ribbon each 1 yd. 2 ft. long for doll dresses. How many yards should she ask for at the store?

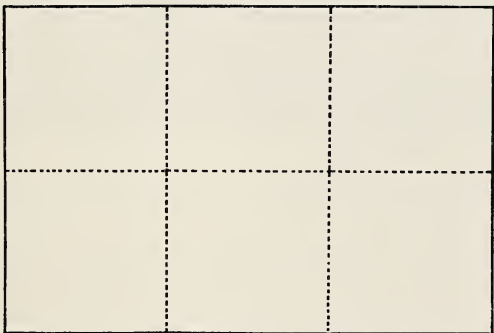
WE OFTEN NEED TO FIGURE AREAS

Do you remember what we mean by **area**? We measure area in square inches, square feet, square yards, and so on.

Here is a square inch. It is a square having sides each one inch long. The space inside the four lines is an area one inch square. What is a square foot? A square yard? A square mile?



To get the area of a rectangle we think of it as divided into squares. The rectangle below is 3 inches long and 2 inches wide. If we divide it into square inches, we can see that it contains 6 square inches.



An easier way to find the number of square inches in the rectangle is to multiply its length by its width. $2 \times 3 = 6$. There are 3 sq. in. in one row. In two rows there are 2×3 sq. in., or 6 sq. in.

To find the area of a rectangle, multiply its length by its width in the same unit of measure.

1. Find the area of a floor 12 ft. by 15 ft. (Sometimes written 12 ft. \times 15 ft. and read 12 ft. by 15 ft.)

2. How many square yards in a floor 12 ft. by 15 ft.?

3. Jim wants to varnish his bedroom floor, which is 8 ft. 6 in. by 11 ft. 8 in. The varnish is sold in pint and in quart cans. If a quart of varnish covers 144 sq. ft., how much does he have to buy?

$$8 \text{ ft. } 6 \text{ in.} = 8\frac{1}{2} \text{ ft.}$$

← Change to feet.

$$11 \text{ ft. } 8 \text{ in.} = 11\frac{2}{3} \text{ ft.}$$

← Change to feet.

$$8\frac{1}{2} \times 11\frac{2}{3} = 99\frac{1}{6} \text{ sq. ft.}$$

← Multiply.

There are $99\frac{1}{6}$ sq. ft. in this floor.
He should buy a quart.

4. Estimate the area of your schoolroom floor in square yards. Then measure the floor. Was your estimate a good one?

5. Estimate the area of your desk top in square feet. Then measure it.

6. How many square feet are in your largest piece of blackboard? Estimate and then measure.

Find the area of each of the following rectangles.

7. 8 ft. 3 in. \times 6 ft. 6 in.

11. 3' 8" \times 4' 2"

8. 15 yd. \times 6 yd. 2 ft.

12. 21' 4" \times 11' 9"

9. $10\frac{1}{2}$ in. \times 6.3 in.

13. 28 rd. \times $6\frac{1}{2}$ rd.

10. 16' 2" \times 18' 3"

14. How many acres
in a field 80 rd.
long and 40 rd.
wide?

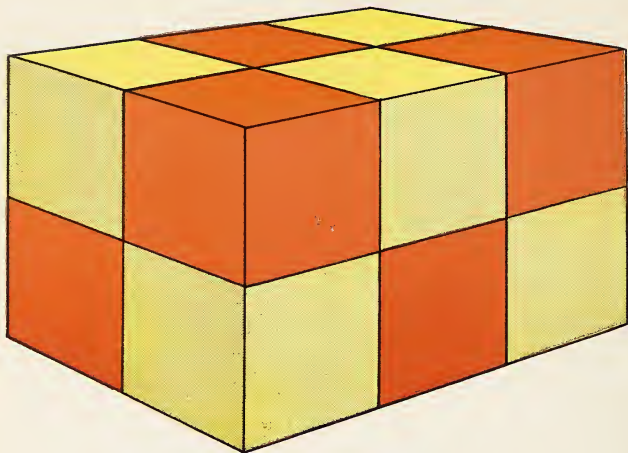
(16' means 16 ft.
2" means 2 in.)



THE GEORGE WASHINGTON BRIDGE

This bridge was built at an expense of about \$60,000,000. It crosses the Hudson River from Manhattan Island to New Jersey in a single span 3,500 feet long. The towers are 635 feet high, and the entire distance between anchorages is 4,760 feet. The wire cables upon which this bridge hangs contain 26,474 wires each, and the wires in the cables are 0.196 inch in diameter, or thickness.

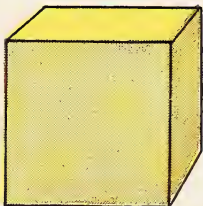
The clearance above the water in the river is 250 feet. The roadway on the bridge is 120 feet in width. It is estimated that the number of automobiles using the bridge each year is 6,000,000 or more.



SHOWING TED HOW TO BUILD

Charles made a pile of blocks like that in the picture for his little brother, Ted. Each block was 1 in. high, 1 in. wide, and 1 in. thick. The pile was 3 in. long, 2 in. wide, and 2 in. thick.

1. How many blocks were in the top layer of the pile of blocks? How many layers were in the pile? How many blocks were in the pile?



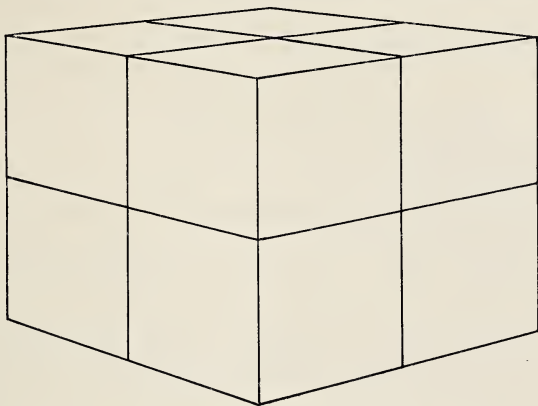
2. If each block was 1 cubic inch, how many cubic inches were in the pile of blocks that Charles made?

Here is a picture of a block that is 1 inch high, 1 inch wide, 1 inch thick. It is **1 cubic inch**.

AN EASIER WAY

1. An easy way to find the number of cubic inches in a pile of blocks 3 inches long, 2 inches wide, and 2 inches thick, is to multiply the three dimensions of the pile. $3 \times 2 \times 2 = ?$

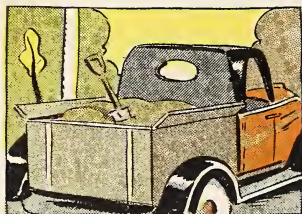
To find the cubic contents or volume of a solid, each side having the shape of a rectangle, multiply together the three dimensions of the figure.



2. Above is a rectangular solid, 2 in. long, 2 in. wide, and 2 in. thick. How many **one-inch cubes** or cubic inches are there in one layer of this solid? How many cubic inches are there in the whole solid?

3. Draw a box 5 inches long, 4 inches wide, and 2 inches deep. Divide it into one-inch cubes. How many one-inch cubes does it contain? Now multiply the three dimensions. Do you get the same result?

MEASURING SAND AND SOIL



1. How many cubic yards of sand will a truck hold if the body measures 10 ft. by 6 ft. by 3 ft.? You will need the **table of cubic measure** in order to work this problem.

Read the table below and solve the problem.

1728 cubic inches (cu. in.)	=	1 cubic foot (cu. ft.)
27 cu. ft.	=	1 cubic yard (cu. yd.)
231 cu. in.	=	1 gallon (gal.)
128 cu. ft. of wood	=	1 cord

$$10 \times 6 \times 3 \text{ cu. ft.} = 180 \text{ cu. ft.}$$

$$180 \text{ cu. ft.} \div 27 =$$

$$6\frac{2}{3} \text{ cu. yd.}$$

←Cubic feet in truck body

←Cubic yards in truck body

The truck will hold $6\frac{2}{3}$ cu. yd.

2. Jim's father is digging a cellar 50 feet by 27 feet by 10 feet. How many cubic yards of dirt must he remove?

3. What is the volume of a box 10 inches by 6 inches by 2 inches?

4. Joan's little brother has a sand box that is 36 in. long, 20 in. wide, and 12 in. deep. How many cubic feet of sand will it hold when it is filled to half its depth? $3 \times 1\frac{2}{3} \times \frac{1}{2} = ?$

5. How much will be the cost of 2 loads of top soil each containing 96 cu. ft. at 75c a cu. yd.?

USING DIVISION IN LIFE

1. Each window in Tom's schoolroom is 5 ft. 6 in. from top to bottom. How many feet and inches is the middle of the window from the bottom? $\frac{1}{2}$ of $5' 6'' = ?$

To find one-half of a number, divide by 2.

Write the divisor 2 at the left of the dividend, as in dividing any other numbers.

Divide: $5 \div 2 = 2$, and 1 remainder.
Write 2 in the quotient over 5.
Remember the 1 r.

$$1 \text{ ft.} = 12 \text{ in.} \quad 12 + 6 = 18$$

Divide: $18 \div 2 = 9$. Write 9 in the quotient over 6.

The quotient is 2 ft. 9 in.

The middle of the window is 2 ft. 9 in. from the bottom.

2. Last summer Lucille spent 4 weeks and 2 days visiting in the homes of three of her friends. She stayed the same length of time with each of the three friends. How many weeks and days did Lucille spend with each of the friends?

Find the quotients in these examples. Check by multiplying the quotient by the divisor.

$$3. \overline{5)6 \text{ lb. } 4 \text{ oz.}}$$

$$7) \overline{12 \text{ gal. } 1 \text{ qt.}}$$

$$4. \overline{6)19 \text{ hr. } 30 \text{ min.}}$$

$$4) \overline{45 \text{ yr. } 8 \text{ mo.}}$$

$$5. \overline{2)3 \text{ yd. } 2 \text{ ft. } 0 \text{ in.}}$$

$$3) \overline{7 \text{ gal. } 3 \text{ qt. } 1 \text{ pt.}}$$

THESE WILL TRY YOU OUT

1. How many pecks are in 4 bu.?
2. How many quarts are in $2\frac{1}{2}$ gal.?
3. How many inches are in 3 ft. 5 in.?
4. How many hours are in 2 da. 14 hr.?
5. How many square feet are in 3 sq. yd.?
6. How many minutes are in 1 hr. 16 min.?

Write the answers on your paper.

7. 62 in. = __ ft. __ in.
8. 2300 lb. = __ T. __ cwt.
9. 21 mo. = __ yr. __ mo.
10. $27\frac{1}{2}$ oz. = __ lb. __ oz.
11. 32 da. = __ wk. __ da.
12. 2.4 hr. = __ hr. __ min.
13. $\frac{1}{8}$ mi. = __ ft.

Number your paper from 14 to 18 and write what is needed to fill out this table. First use fractions in writing these measures. Then use decimals. The first one is done for you.

	MEASURE	USING FRACTIONS	USING DECIMALS
14.	1 hr. 30 min.	$1\frac{1}{2}$ hr.	1.5 hr.
15.	9 yr. 3 mo.	_____	_____
16.	62 lb. 10 oz.	_____	_____
17.	8 sq. yd. $4\frac{1}{2}$ sq. ft.	_____	_____
18.	30 yd. $1\frac{1}{2}$ ft.	_____	_____

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples in this test. If you make mistakes in any row, she will have you do others of the same kind in the row of the same number on the next page.

Multiply.

- | | | |
|--|--|--|
| 1. 5 hr. 10 min.
<div style="text-align: center; margin-left: 100px;">5</div> <hr style="width: 100px; margin-left: 100px;"/> | 7 bu. 1 pk.
<div style="text-align: center; margin-left: 100px;">3</div> <hr style="width: 100px; margin-left: 100px;"/> | 2 gal. 3 qt.
<div style="text-align: center; margin-left: 100px;">6</div> <hr style="width: 100px; margin-left: 100px;"/> |
| 2. 10 yd. 2 ft. 5 in.
<div style="text-align: center; margin-left: 100px;">4</div> <hr style="width: 100px; margin-left: 100px;"/> | 10 hr. 40 min. 15 sec.
<div style="text-align: center; margin-left: 100px;">5</div> <hr style="width: 100px; margin-left: 100px;"/> | |

Find the cost of:

3. (a) 2 lb. 8 oz. butter at \$.32 a pound.
 (b) 5 bu. 1 pk. apples at \$2.00 a bushel.

Find the area of a rectangle:

- | | |
|---|-----------------------------------|
| 4. $2\frac{1}{2}$ ft. \times $2\frac{1}{3}$ ft. | 4 ft. 3 in. \times 2 ft. 6 in. |
| 5. 15.5 in. \times 12.3 in. | 20 ft. 8 in. \times 6 ft. 4 in. |

Find the volume of a rectangular solid:

6. 5 ft. \times 3 ft. \times 3 ft. $10\frac{1}{2}$ in. \times 4 in. \times $3\frac{1}{2}$ in.
7. (a) How many square feet in a rectangle 8.2 yd. \times 4.4 yd.?
 (b) A sand box the shape of a rectangular solid is 9 ft. \times 12 ft. \times 1.25 ft., inside measurements. How many cubic yards of sand will be needed to fill it half full?
8. Find the quotients by division.

$3 \overline{) 5 \text{ yd. } 1 \text{ ft. } 3 \text{ in.}}$	$6 \overline{) 17 \text{ gal. } 1 \text{ qt. } 0 \text{ pt.}}$
--	--

166 Remedial Exercises in Multiplication
and Division of Measures

CURING OUR WEAK SPOTS

Use these examples after the test on page 165.

Multiply.

- | | | | |
|----|------------------------------------|---------------------------------|---------------------------|
| 1. | 8 lb. 3 oz.
<u>5</u> | 2 bu. 1 pk.
<u>2</u> | 10 gal. 1 qt.
<u>3</u> |
| | 15 hr. 45 min.
<u>8</u> | 12 ft. 8 in.
<u>6</u> | 7 hr. 30 min.
<u>2</u> |
| 2. | 16 hr. 50 min. 20 sec.
<u>8</u> | 30 gal. 3 qt. 1 pt.
<u>6</u> | |

Find the cost of:

3. (a) 3 lb. 8 oz. rib roast at \$.28 a pound.
(b) 30 ft. 8 in. garden hose at \$.12 a foot.

Find the area of a rectangle:

4. 10 ft. 2 in. \times 3 ft. 4 in. 70 ft. 9 in \times 30 ft. 10 in.
5. 3' 8" \times 1' 11" 12.25 in. \times 6.75 in.

Find the volume of a rectangular solid:

6. 11 ft. \times 4 ft. \times 2 ft. $6\frac{1}{4}$ in. \times 2 in. \times $1\frac{1}{2}$ in.
7. (a) How many square rods in a rectangular field
40 $\frac{1}{2}$ rd. long and 30 $\frac{1}{4}$ rd. wide?
(b) A wagon bed the shape of a rectangular
solid is 9 ft. \times 3 ft. \times 1 ft., measured on the
inside. How many cubic yards of crushed
stone will it hold when level full?

8. Find the quotients.

$$\begin{array}{r} 2 \quad ? \quad 10 \\ 3 \overline{) 7 \text{ yd. } 2 \text{ ft. } 6 \text{ in.}} \end{array}$$

$$\begin{array}{r} ? \quad ? \quad 1 \\ 4 \overline{) 14 \text{ gal. } 2 \text{ qt. } 0 \text{ pt.}} \end{array}$$

NAMING THE RIGHT THING TO DO

This test will help you find out how well you can tell what to do in problems. Your teacher will give you time to try each problem. Write the answers on your paper.

Read each problem carefully, then write whether you would add, subtract, multiply, or divide.

1. There are 250 pupils in the Cherry Township school. They go home in busses. If a bus holds 25 pupils, how many bus loads will be needed to take all of them home?

2. Howard bought a knife for 45¢, a baseball for 75¢, and a sweater for \$3.60. Find the total cost.

3. Carl feeds his chicks $\frac{3}{4}$ lb. of grits a day. At this rate, how many pounds will be needed for 30 days?

4. Edith has 87¢ in her bank. She wants to buy a bicycle tire that costs \$1.75. How much more money does she need to buy the tire?

5. If a yard of ribbon makes 6 badges, how many yards will be needed to make 42 badges?

6. A storeroom is 70 ft. long and 30 ft. wide. How many square feet of floor space are there in it?

If you made mistakes in this test, give more time after this to the question, "What is to be done?" This is the most important question in problem solving.

CHAPTER V

KEEPING ACCOUNTS

A SALES SLIP FROM A MARKET

In stores clerks sometimes write the price of each purchase on the outside of your package and then add to find the total amount. Sometimes they use a cash register which prints the price of each purchase and the total. Sometimes they make a **sales slip**.

J. S. Mulroy

Fresh and Smoked Meats
Choice Fruits and Vegetables

Phones 4488 5001
Kenwood 4489 Lake Park Ave.
Pittsburgh, Pa., 2/3 1935

J. W. Wister

1935 Penn. Ave.

3 lb. Meat Loaf at 25¢	.75
1 hd. Lettuce	.15
1 pk. Green Beans	.15
	<hr/>
	1.05

Sales slips like this one are very common. Two copies are made of each slip, one for the store and one for the customer. If the customer pays cash, the slip is useful because he can easily check the amount paid. If the store does a credit business and the customer pays monthly, the slips can be checked with the bill at the end of the month.

EVERYBODY SHOULD UNDERSTAND THESE

Make out sales slips for the following persons and purchases. Write the totals on each slip correctly. Use a different date on each slip.

The sign @ means at and is used in writing prices. For example, "10 lb. potatoes @ 5¢" means 10 lb. potatoes at 5¢ a pound; "2 bu. apples @ \$2" means 2 bu. apples at \$2 per bushel.

1. Mrs. K. Lang
1238 University Ave.

10 lb. potatoes @ 3¢
2 lb. dates @ 12½¢
5 lb. prunes @ 9¢

2. J. W. Thorn
58 Howard St.

2 lb. veal chops @ 21¢
2 hd. lettuce @ 12¢

3. John Capps
191 Western Ave.

1½ lb. ham @ 26¢
4 lb. smoked
shoulder @ 9½¢
½ bu. apples @ \$2

4. John Capps
191 Western Ave.

2 cans Golden
Bantam corn @ 10¢
2 cans peaches @ 15¢
3 jars peanut
butter @ 20¢

5. R. J. Thompson
28 Elm St.

½ doz. grapefruit @ 70¢
2 lb. Japan Tea @ 45¢

6. S. B. Davis
18 S. Oak St.

4 cans sardines @ 7¢
2 lb. pecans @ 30¢

7. Mrs. J. O'Shea
195 E. 78th St.

2 doz. oranges @ 30¢
2 lb. coffee @ 32¢
1 jar preserves @ 16¢

8. Mrs. J. O'Shea
195 E. 78th St.

2 lb. Swiss steak @ 22¢
2 jars olives @ 31¢
2 cans
raspberries @ 18¢

A BILL FROM A DEPARTMENT STORE

When one has an account at a store, he is usually required to pay his bill monthly. Here is the kind of bill sent to customers monthly by one of the largest stores in the world.

SCOTT & COMPANY

Importers, Retailers, Manufacturers

Chicago, January 2, 1935

Sold To

Mr. Hamilton Washburne
1224 E. Baker St.
Chicago

Date Paid _____ Check No. _____ Amount \$ _____

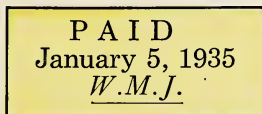
Notice—Merchandise to be credited on current bill must be returned before the last day of the month.

Dec.			Daily Totals	Total Account
	Acct. Br't Forward			1 75
2	1 Clock	1 00		
	1 Blouse	1 00		
	1 Skirt	3 25		
	3 Pr Hose 35	1 05	6 30	8 05
4	1 Relish Dish	1 00		
	1 Lamp Shade	50	1 50	9 55
8	2 Sweaters 1 00	2 00		
	1 Sweater	3 95	5 95	15 50
8	Cash		1 75	13 75

EVERYWHERE IN BUSINESS

The items in the bill on page 170 were taken from sales slips. Notice first the "Account brought forward"—\$1.75. The customer owed this much from the previous month. A blouse, a skirt, and 3 pairs of hose purchased on December 2 are recorded on the bill. In the next column the total amount of the day's purchases is given as \$6.30. In the last column the \$6.30 is added to \$1.75 to get the amount owed up to the end of that day. On December 8 the customer paid \$1.75, to cover the account brought forward from the month before. This is recorded as "Cash" and is subtracted from \$15.50, leaving \$13.75 as the total amount owed.

When a bill is paid, the store marks it like this:



This is called **receipting** a bill. The initials are those of the person who received the money.

1. Make out a bill for Mr. Capps' purchases shown in examples 3 and 4 on page 168. Give a different date to each set of purchases.

2. Make out a bill for Mrs. O'Shea's purchases shown in examples 7 and 8 on page 169. Give a different date to each set of purchases.

3. Receipt each of the two bills just made out, using your own initials.

CAN YOU WRITE A RECEIPT?

If you do not have the bill with you when you pay it, you should ask for a **receipt**. The reason for this is that you might be asked, through some mistake, to pay the bill again.

Here is a form of receipt in common use. It is not necessary to use a printed form. Receipts are often made out on ordinary writing paper.

Boston, Mass., May 6, 1935

RECEIVED from E. K. Eckert

Four and 25/100 Dollars

for repairing furnace.

\$ 4.25

S. W. Wells

In writing out a receipt, you should mention (a) the place, (b) the date, (c) the name of the payer, (d) the amount paid, (e) that for which it is paid, and (f) the name of the person paid.

Write a receipt for each of the following payments.

1. Clara Pell paid you \$6.50 for music lessons during the previous month.
2. Frank Seed gave you \$1.10 for your old wagon.
3. You paid the grocer, H. H. Kinney, \$10.80 on account.
4. Bob Ankers paid you \$1.60 for your ice skates.

CAN YOU WRITE A CHECK ON A BANK?

A **check** is one of the most important things to know about in business. Below is a check made out by F. J. Foster to Henry James.

UNIVERSITY NATIONAL BANK	
St. Louis, Mo.	July 12, 1935 No. 15
Pay to the order of	Henry James \$21.40
Twenty-one and 40/100 ----- Dollars	
F. J. Foster	

It directs the University National Bank to pay Henry James the sum of \$21.40. The bank will do this if Mr. James writes his name on the back of the check (**indorses** it) and if Mr. Foster has as much as \$21.40 in the bank. Don't you think Mr. Foster should be sure he has enough money in the bank to pay the check before he writes it? Sometimes people are careless and write checks when they do not have enough money in the bank to pay them.

People are not so liable to make this mistake if they fill out a **stub** for each check written in their check book. A stub is a part of the check book and is not torn out when the check is torn out. It is a record of the check. On page 174 is the stub from which the above check was torn.

No. <u>15</u>	Date <u>July 12, 1935</u>	
To <u>Henry James</u>		
For <u>Harvesting</u>		
Balance Brought Forward	\$128	65
Amount Deposited		
Total	128	65
Amount this Check	21	40
Balance Carried Forward	\$107	25

How much money did Mr. Foster have in the bank when he wrote the check? How much after the check was paid?

Make up two checks with stubs and fill them out for the payments in problems 1 and 2. Suppose Mary Smith

has \$50 in the bank before she writes the first check.

1. She pays Horace Alman \$2.75 for weeding.
2. She pays Miss Alton \$4.50 for music lessons.

Sending a Money Order

Form 6001

POST OFFICE DEPARTMENT
THIRD ASSISTANT POSTMASTER GENERAL
DIVISION OF MONEY ORDERS

No. _____
Stamp of Issuing Office

The Postmaster
will insert

here
the office drawn on, when the office named by
the remitter is in Alaska, and does not transact money-order business.

Spaces above this line are for the Postmaster's record, to be filled in by him

Application for Domestic Money Order

Spaces below to be filled in by purchaser, or, if necessary,
by another person for him

Amount

1 Dollars 68 Cents

Pay to } J. C. May & Co.
Order of }
(Name of person or firm for whom order is intended)

Whose
Address } 210 Harlem Street
Is } No. 210

Post } New York
Office }
State New York

Sent by Mary Elson
(Name of sender)

No. 415 East Wayne Street
City } Denver, Colorado
and }
State }

PURCHASER MUST SEND ORDER AND COUPON TO PAYEE

Mary Elson went to the post office for a money order to send to the J. C. May & Co. for a pair of skates. The picture shows her **ap-
plication** for a money order. The clerk in the post office wrote the money order for \$1.68 and Mary sent it with her letter. The J. C. May & Co. can cash the money order in New York.

Mary kept the receipt given her.

HOW UNCLE SAM HELPS

Get blanks from your post office (free of charge) and write applications for the following money orders.

1. \$1.75 being sent by you to Wilson & Co., 72 Sheffield Ave., Boston, Mass.

2. \$2.38 being sent by you to Butler Brothers, 185 Tremont St., San Francisco, California.

Deposit Slips

UNIVERSITY NATIONAL BANK		
Deposited for Account of		
<i>W. M. Small</i>		
<i>1482 Morgan St.</i>		
St. Louis, Mo., <i>April 6, 1935</i>		
Please list each check separately.		
Currency	Dollars	Cents
	3	85
Checks as follows:	35	00

When you deposit money in a bank, the bank will usually ask you to make out a **deposit slip**. This is a slip like the one pictured here. You write your name, your address, and the date at the top. Then you write the amount of currency (or cash) you are going to deposit, and the amount in checks, if any.

The slip pictured shows that Mr. Small deposited \$3.85 in cash and a check, perhaps his weekly pay check, for \$35.

Make out a slip in your own name for each of the following deposits:

1. Cash, \$2.60; check for \$10; check for \$5.10.
2. Cash, \$1.81; check for \$6.25; check for \$12.50.
3. Cash, \$7.92; checks for \$4.50, \$15, \$2.10, and \$40.00.

Income			Expenditures		
Feb.			Feb.		
6	Post	18	9	Haircut	40
8	Allowance	50	15	Choc.	
13	Post	20		Apples	10
15	Allowance	50	19	Sharp.	
17	Errand	10		Skates	20
18	Snow	25	20	Strap	10
20	Post	22	22	Candy	10
22	Allowance	50	26	Movie	25
23	Snow	25			1 15
27	Post	16			
		2 86		Balance	1 71
					2 86

FRANK KENT'S CASHBOOK

These pages are from Frank's cashbook for the month of February. Under **Income** he has put down all the money he received. Under **Expenditures** he has put down all the money he spent. His weekly allowances, together with what he made by selling *The Saturday Evening Post*, shoveling snow, and running errands, amount to \$2.86. For various things he spent \$1.15. This leaves him a **Balance** of \$1.71. If you want to "keep books" as Frank did, you can buy a cashbook for 10 or 15 cents.

For March, Frank turned over a page in his book and started his account like this.

Income			Expenditures		
Mar.	Brought forward	1 71			
1					

1. Frank decided to deposit \$1.50 of his balance in the bank. Make out his deposit slip.

2. Kate had the following income and expenditures during July. Make out her cashbook.

July 1	Present from Aunt Margaret	\$1.00
July 2	Received allowance25
July 2	Bought flags30
July 4	Bought a soda10
July 4	Bought candy bars20
July 9	Received allowance25
July 12	Went to movie25
July 16	Received allowance25
July 20	Bought cashbook10
July 23	Received allowance25
July 25	Received birthday gift	1.00
July 30	Received allowance25
July 30	Bought bottle of paste10

3. Suppose your father gives you a check on the Freeman National Bank for \$5. You can take the check to this bank, indorse it, hand it to the cashier, and get \$5 cash in exchange. This \$5 is taken from your father's bank account.

Do you know what happens to the check from that point on? The bank makes a record of the check and marks it in such a way as to show it has been cashed. The check is returned to your father for his records at the end of the month.

CHAPTER VI

PERCENTAGE AND GRAPHS

What Does Per Cent Mean?

STEEL OUTPUT

Rises 2 Points to 45%

PERCENTAGE IN NEWSPAPER HEADLINES

In percentage we work with per cent—10 per cent, 75 per cent, 90 per cent. Perhaps you heard the principal say last month that 90 per cent of the pupils were not absent during the month. What does the name per cent mean?

Per cent comes from Latin and means “in a hundred.” The principal meant that in each 100 pupils 90 were not absent during the month. Write 90 per cent in this way, **90%**.

What's new about per cent? It's a new way of saying what you have learned before. You learned in fractions that $\frac{90}{100}$ means 90 hundredths. You learned in decimals that .90 means 90 hundredths. Now you learn that 90% is another way to say 90 hundredths. $90\% = \frac{90}{100} = .90 = 90$ hundredths

Now copy this exercise, and fill the blanks.

1. $90\% = 90$ hundredths $= \frac{\quad}{100}$
2. $10\% = \underline{\quad}$ hundredths $= \frac{\quad}{100}$
3. $6\% = \underline{\quad}$ hundredths $= \frac{\quad}{100}$
4. $12\frac{1}{2}\% = \underline{\quad}$ hundredths $= \frac{\quad}{100}$

You saw how to write 90 hundredths in three different ways. Write each of the following in three different ways.

- | | |
|------------------|------------------|
| 1. 10 hundredths | 5. 16 hundredths |
| 2. 25 hundredths | 6. 40 hundredths |
| 3. 50 hundredths | 7. 75 hundredths |
| 4. 5 hundredths | 8. 6 hundredths |

Changing Fractions to Per Cents

1. Can you change $\frac{1}{5}$ to per cent? Change it to hundredths first.

$$\frac{1}{5} = \frac{20 \times 1}{20 \times 5} = \frac{20}{100}$$

$$\frac{20}{100} = 20\%$$

← Change $\frac{1}{5}$ to hundredths, by multiplying both terms of the fraction by 20.

← Change $\frac{20}{100}$ to per cent.

Do these in the same way.

2. $\frac{1}{4} = \frac{\quad}{100} =$

5. $\frac{3}{10} = \frac{\quad}{100} =$

3. $\frac{3}{4} = \frac{\quad}{100} =$

6. $\frac{4}{5} = \frac{\quad}{100} =$

4. $\frac{1}{10} = \frac{\quad}{100} =$

7. $\frac{2}{5} = \frac{\quad}{100} =$

8. Change $\frac{1}{8}$ to per cent.

$$\frac{1}{8} = \frac{12\frac{1}{2} \times 1}{12\frac{1}{2} \times 8} = \frac{12\frac{1}{2}}{100} = 12\frac{1}{2}\%$$

9. Change $\frac{1}{3}$ to per cent.

$$\frac{1}{3} = \frac{33\frac{1}{3} \times 1}{33\frac{1}{3} \times 3} = \frac{33\frac{1}{3}}{100} = 33\frac{1}{3}\%$$

Now change these to per cents.

10. $\frac{3}{8} = \frac{\quad}{100} =$

11. $\frac{5}{8} = \frac{\quad}{100} =$

12. $\frac{2}{3} = \frac{\quad}{100} =$

How would you change .15 to per cent? Remember that .15 means 15 hundredths and 15% means 15 hundredths. Therefore, $.15 = 15\%$

Now do these.

- | | | | | |
|----|--------|-------|--------|-------------------------------------|
| 1. | .25 = | .40 = | .02 = | $.025 = \frac{2\frac{1}{2}}{100} =$ |
| 2. | .10 = | .05 = | .055 = | .125 = |
| 3. | .075 = | .80 = | .015 = | .005 = |

Changing Per Cents to Fractions and to Decimals

Change the following per cents, as shown in the first example, to fractions and decimals.

- | | | |
|----|--|----------|
| 1. | $10\% = \frac{10}{100} = \frac{1}{10} = .10$ | |
| 2. | $50\% =$ | $80\% =$ |
| 3. | $75\% =$ | $25\% =$ |
| 4. | $20\% =$ | $5\% =$ |
| 5. | $1\% =$ | $15\% =$ |
| 6. | Change $12\frac{1}{2}\%$ to a fraction. | |

$$12\frac{1}{2}\% = \frac{12\frac{1}{2}}{100} = \frac{12\frac{1}{2} \div 12\frac{1}{2}}{100 \div 12\frac{1}{2}} = \frac{1}{8}$$

7. Change $33\frac{1}{3}\%$ to a fraction.

$$33\frac{1}{3}\% = \frac{33\frac{1}{3}}{100} = \frac{33\frac{1}{3} \div 33\frac{1}{3}}{100 \div 33\frac{1}{3}} = \frac{1}{3}$$

Change the following per cents to fractions and decimals.

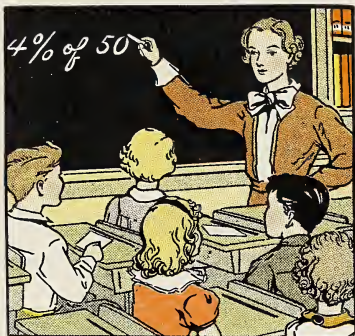
- | | | | |
|----|---------------------|---------------------|---------------------|
| 8. | $66\frac{2}{3}\% =$ | $37\frac{1}{2}\% =$ | $62\frac{1}{2}\% =$ |
| 9. | $16\frac{2}{3}\% =$ | $87\frac{1}{2}\% =$ | $8\frac{1}{3}\% =$ |

HOW MANY ARE ABSENT?

1. When all are present, there are 50 pupils in our room. The teacher says 4% are absent today. How many pupils are absent?

We learned that 4% of 100 = 4.

How shall we find 4% of 50?



One Way

$$4\% = \frac{4}{100} = \frac{1}{25}$$

$$\frac{1}{25} \times 50 \text{ pupils} = 2 \text{ pupils}$$

← Change per cent to a fraction.

← Multiply.

2 pupils were absent.

Another Way

$$4\% = \frac{4}{100} = .04$$

$$.04 \times 50 \text{ pupils} = 2 \text{ pupils}$$

← Change per cent to a decimal.

← Multiply.

2 pupils were absent.

Find.

2. 4% of 20

3. 25% of 40

4. 20% of 60

5. 5% of 20

6. 40% of 80

7. 2% of 50

8. 10% of 700

9. $16\frac{2}{3}\%$ of 30

10. $33\frac{1}{3}\%$ of 303

11. $66\frac{2}{3}\%$ of 90

12. $37\frac{1}{2}\%$ of 800

13. $62\frac{1}{2}\%$ of 48



DONALD PICKING CHERRIES

1. Donald picked 25 quarts of cherries in Mr. Drake's orchard. He was allowed to keep 40% of all he picked. How many quarts could he keep?

2. Miss Williams gave a spelling test of 50 words. She told Helen her mark was 92%. How many words did Helen spell right?

Here are the marks of other pupils in the class. Make a table like the one below and write the number of words each pupil spelled right.

	Pupil	Mark	Words Spelled Right
3.	Carl	80%	_____
4.	George	76%	_____
5.	Ethel	90%	_____
6.	Sam	98%	_____
7.	Bruce	88%	_____
8.	David	94%	_____
9.	Wesley	60%	_____
10.	Margaret	82%	_____

SOMETHING TO BE LEARNED WELL

Can you do these without using pencil and paper? The first one is done for you.

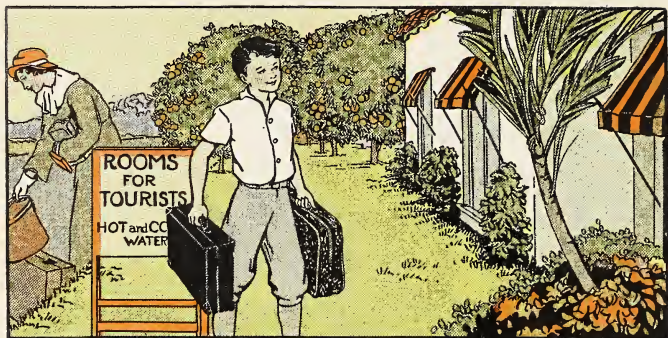
1. 10% of a number is $\frac{1}{10}$ of it.
2. 25% of a number is ____ of it.
3. 50% of a number is ____ of it.
4. 20% of a number is ____ of it.
5. $16\frac{2}{3}\%$ of a number is ____ of it.

Per cents like $16\frac{2}{3}\%$ make trouble for some pupils. The fraction makes the trouble. There are only a few per cents of this kind in common use. They are given in the box below. Learn them.

$16\frac{2}{3}\% = \frac{1}{6}$	$12\frac{1}{2}\% = \frac{1}{8}$
$33\frac{1}{3}\% = \frac{1}{3}$	$37\frac{1}{2}\% = \frac{3}{8}$
$66\frac{2}{3}\% = \frac{2}{3}$	$62\frac{1}{2}\% = \frac{5}{8}$
$87\frac{1}{2}\% = \frac{7}{8}$	

You will be a better worker in percentage if you remember that $\frac{1}{2} = 50\%$, $\frac{1}{3} = 33\frac{1}{3}\%$, and so on. Learn the per cents for the following fractions as well as you have learned your multiplication combinations.

$\frac{1}{2} = 50\%$	$\frac{1}{8} = 12\frac{1}{2}\%$	$\frac{4}{10} = \frac{2}{5} = 40\%$
$\frac{1}{3} = 33\frac{1}{3}\%$	$\frac{3}{8} = 37\frac{1}{2}\%$	$\frac{6}{10} = \frac{3}{5} = 60\%$
$\frac{2}{3} = 66\frac{2}{3}\%$	$\frac{5}{8} = 62\frac{1}{2}\%$	$\frac{8}{10} = \frac{4}{5} = 80\%$
$\frac{1}{4} = 25\%$	$\frac{7}{8} = 87\frac{1}{2}\%$	$\frac{1}{20} = 5\%$
$\frac{3}{4} = 75\%$	$\frac{1}{10} = 10\%$	$\frac{1}{25} = 4\%$
$\frac{1}{5} = 20\%$	$\frac{2}{10} \text{ or } \frac{1}{5} = 20\%$	$\frac{1}{50} = 2\%$
$\frac{5}{6} = 83\frac{1}{3}\%$	$\frac{3}{10} = 30\%$	$\frac{1}{100} = 1\%$



ROY'S HOME IN FLORIDA

Roy lives in Florida. During the winter months he helps his mother. They rent rooms to tourists. Roy goes to the store for supplies, fills pitchers with drinking water, and helps carry the tourists' bags. Sometimes he picks oranges in the yard and takes them to the rooms of the visitors.

1. When three rooms are rented for the night, Roy and his mother get \$3.50 from the tourists. Roy gets 10% of this. How much does he get?

2. In one month Roy and his mother took in \$75.00. Roy's mother received 90% of this. How much was her share? What was Roy's share?

3. Roy is saving money to buy a suit of clothes in the spring. It will cost \$12.00. He now has 82% of the price of the suit. How much money has he?

4. Sometimes the tourists buy oranges to take with them. Roy gets 20% for himself on all the oranges he sells. Once a man bought 5 doz. at 12¢ a doz. How much did Roy get for himself?

**MONTGOMERY AND COMPANY
SEMIANNUAL CLEARANCE SALE
20% Off on All Items Listed Below**

Women's Coats..	\$10.00	Handkerchiefs....	\$.10
Women's Shoes..	4.00	Men's Shirts.....	1.00
Curtains.....	.80	Sweaters	2.50
Oil Cloth, per yard	.20	Boys' Knickers...	.85
Floor Lamps	3.00	Boys' Shirts50
Blankets.....	4.00	Girls' Silk Dresses.	3.00

SALE AT A DEPARTMENT STORE

1. Ruth's mother bought a coat at Montgomery and Company's clearance sale. The regular price was \$10.00. What was the amount taken off?

One Way

$$\frac{1}{5} \times \$10.00 = \$2.00$$

\$2 was taken off.

Another Way

$$.20 \times \$10.00 = \$2.00$$

\$2 was taken off.

2. Mr. O'Donnell came home from the same sale with a sweater and a pair of knickers for his son, Pat. What was the regular price for both? How much money was saved on each?

What was the amount taken off the price of each of the following purchases at this sale?

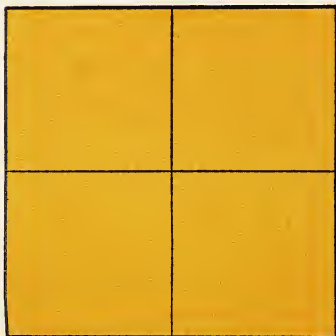
- | | |
|----------------------------|--------------------|
| 3. 1 pair of women's shoes | 6. 3 boys' shirts |
| 4. 10 yards oil cloth | 7. 6 handkerchiefs |
| 5. 2 blankets | 8. 1 silk dress |

THESE WILL TRY YOU OUT

Here are many kinds of examples in finding a per cent of a number. If you can do these, you understand this part of percentage very well.

- | | |
|-----------------------------------|-------------------------------------|
| 1. 10% of \$12 = ? | 11. 16% of 600 = ? |
| 2. 4% of \$15 = ? | 12. 80% of 810 = ? |
| 3. 6% of \$47 = ? | 13. 5% of \$65 = ? |
| 4. 25% of 400 = ? | 14. 10% of 62 = ? |
| 5. 50% of 625 = ? | 15. $12\frac{1}{2}\%$ of \$8.00 = ? |
| 6. 18% of \$40 = ? | 16. 11% of \$55 = ? |
| 7. 60% of \$1200 = ? | 17. 6% of \$10 = ? |
| 8. $4\frac{1}{2}\%$ of \$16 = ? | 18. 8% of 1500 = ? |
| $.045 \times \$16 = ?$ | |
| 9. $37\frac{1}{2}\%$ of \$200 = ? | 19. 2% of \$4 = ? |
| 10. $22\frac{1}{2}\%$ of 500 = ? | 20. 20% of 2000 = ? |

-
21. The line above is three inches long. How long is $33\frac{1}{3}\%$ of the line?



22. How long is 50% of the line?

This square is 2 in. long and 2 in. wide.

23. Point to 25% of the square.

24. Point to 75% of it.

25. Show 50% of it.

ALBERT AND BOB USE PERCENTAGE

1. Albert sells balloons on days when there is a football game. Last Saturday he sold 18 balloons at 10¢ each. The balloon company gives him 15% of the money he takes in. How much did he make?

See how many of the following examples you can do without using your pencil. Use your pencil, if you must.

2. 20% of 30 = ?

3. 50% of 200 = ?

4. 75% of 4 = ?

5. 10% of 500 = ?

6. $16\frac{2}{3}\%$ of 60 = ?

7. $33\frac{1}{3}\%$ of 90 = ?

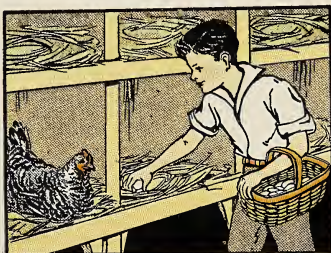
8. $12\frac{1}{2}\%$ of 80 = ?

9. 90% of 10 = ?

10. 6% of 100 = ?

11. 20% of 25 = ?

12. Bob feeds the chickens and gathers eggs each day. His father gives him 10% of the egg money. Last week his father sold 16 dozen eggs at 25¢ a dozen. How much money did Bob get?



WORKING WITHOUT A PENCIL

Do these without using pencil and paper.

1. Miss Jackson gave a test of 25 words in spelling. Louis made a score of 100%. How many words did he spell correctly?

2. If all the pupils in your room are present today, the attendance is ____%.

3. The town of Pleasant Lake has 500 people. If the number of people in the town should increase 20% during the next year, how many people would be added?

4. If the number of people in the town increased 40%, ____ would be added.

5. If the number increased 60%, ____ would be added.

6. If the increase were 80%, ____ would be added.

7. Now suppose the number of people in the town should increase 100% during the next year. How many people would be added?

8. Kenneth bought a suit that was 100% wool. How much of it was wool?

9. Mr. Borden bought a lot for \$1000. He sold it at a profit of 100%. His profit was the money he gained. For how much did he sell the lot?

10. Last month Clara read 510 pages. This month she has read 100% more than last month. She has read ____ pages this month. How many pages has she read altogether in the two months?

FINDING OUR WEAK SPOTS

Number your paper from 1 to 22. Write what is missing in the table below. For example, if a fraction is given, write the decimal and the per cent that are equal to it. The first one is done for you.

Your teacher will give you time to try all the examples. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her in order to find out what the trouble is.

THE TABLE

	Com- mon Frac- tion	Deci- mal Frac- tion	Per Cent		Com- mon Frac- tion	Deci- mal Frac- tion	Per Cent
1.	$\frac{1}{2}$.50	50%	12.	_____	.30	_____
2.	_____	.25	_____	13.	$\frac{7}{10}$	_____	_____
3.	$\frac{3}{4}$	_____	_____	14.	$\frac{1}{12}$	_____	_____
4.	_____	_____	$33\frac{1}{3}\%$	15.	_____	.05	_____
5.	$\frac{1}{6}$	_____	_____	16.	$\frac{3}{30}$	_____	_____
6.	_____	$.66\frac{2}{3}$	_____	17.	_____	_____	35%
7.	$\frac{1}{8}$	_____	_____	18.	_____	.02	_____
8.	_____	_____	$37\frac{1}{2}\%$	19.	$\frac{1}{100}$	_____	_____
9.	_____	$.62\frac{1}{2}$	_____	20.	_____	_____	3%
10.	$\frac{7}{8}$	_____	_____	21.	_____	.5	_____
11.	_____	_____	10%	22.	$\frac{1}{5}$	_____	_____

If you made mistakes in this test, do the exercises on the next page.

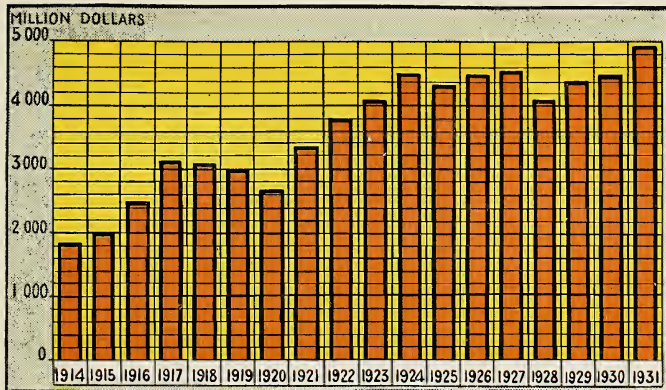
CURING OUR WEAK SPOTS

If you made mistakes in the test on page 189, do these exercises.

Number your paper from 1 to 22. Write what is missing in the table below. For example, if a fraction is given, write the decimal and the per cent that are equal to it.

THE TABLE

	Common Fraction	Decimal Fraction	Per Cent		Common Fraction	Decimal Fraction	Per Cent
1.	_____	.50	_____	12.	_____	_____	30%
2.	$\frac{1}{4}$	_____	_____	13.	_____	.70	_____
3.	_____	_____	75%	14.	$\frac{1}{12}$	_____	_____
4.	_____	$.33\frac{1}{3}$	_____	15.	_____	_____	5%
5.	$\frac{1}{6}$	_____	_____	16.	_____	.15	_____
6.	_____	_____	$66\frac{2}{3}\%$	17.	$\frac{7}{20}$	_____	_____
7.	_____	$.12\frac{1}{2}$	_____	18.	_____	_____	2%
8.	$\frac{3}{8}$	_____	_____	19.	_____	.01	_____
9.	_____	_____	$62\frac{1}{2}\%$	20.	$\frac{3}{100}$	_____	_____
10.	_____	$.87\frac{1}{2}$	_____	21.	_____	_____	$\frac{1}{2}\%$
11.	$\frac{1}{10}$	_____	_____	22.	_____	.20	_____



GOLD HELD IN THE UNITED STATES TREASURY

This bar graph shows the amount of gold in the United States Treasury for each year from the beginning of the World War to 1931. Our government had about \$1,800,000,000 in gold in 1914.

1. About how much did the amount become in 1917?

2. In 1931 about how much did the United States hold in gold? (This was almost half of all the gold money in the world.)

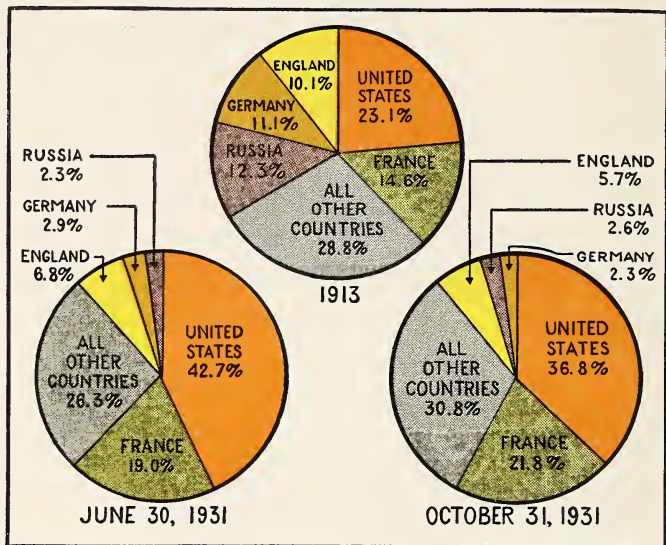
3. Between 1915 and 1917 about how much did the gold in the United States Treasury increase?

4. What was the increase between 1917 and 1931?

5. About how much gold did our country's treasury hold in 1922?

6. How much more gold did the United States Treasury hold in 1922 than in 1915?

Next are circular graphs showing the amounts of gold held by different countries in 1913 and in 1931.



GOLD HELD BY DIFFERENT COUNTRIES

1. In 1913 the United States had what percentage of the world's gold? About what fraction is this?

2. On June 30, 1931, about what fraction of the world's gold did the United States hold?

3. About what fraction did France have at the same time?

4. Without adding, tell what per cent of the world's gold all the countries together had on October 31, 1931. Now add the per cents for all the countries and compare your answers.

Finding What Per Cent One Number Is of Another 193

We have already learned how to get a per cent of a number. Here is a percentage problem that is a little different from the ones we have had before.

1. Esther had 80 cents and spent 36 cents. What per cent of her money did she spend?

$\frac{36}{80} = \frac{9}{20}$	← Fractional part spent
$\begin{array}{r} .45 \\ 20 \overline{)9.00} \\ \underline{80} \\ 100 \\ \underline{100} \\ 0 \end{array}$	← Decimal part spent
$.45 = 45\%$	← Per cent spent

Esther spent 45% of her money.

2. In Elizabeth's class there are 28 pupils. Seven of them have been selected to take part in an assembly program. What per cent of the class will take part in the program?

3. Four of the 28 pupils are going to usher at the program. What per cent is this?

4. The table at the top of the next page shows the number of games won and the number lost by each of the 6 basket ball teams in our league. Find the percentage of games won by each of the 6 teams. Make a table like the one at the top of the next page. Fill the last column with the decimals that are equal to the percentages, as the newspapers do.

194 Finding What Per Cent One Number Is of Another

STANDING OF TEAMS IN BASKET BALL

Team	Games Won	Games Lost	Games Played	Standing in Per Cent
A	18	2	20	_____
B	16	4	20	_____
C	9	9	18	_____
D	6	14	20	_____
E	5	13	18	_____
F	4	16	20	_____

STANDING OF BASEBALL TEAMS

AMERICAN LEAGUE

	W.	L.	Pct.
New York	43	25	.632
Detroit	43	29	.597
Chicago	36	28	.563
Cleveland	37	31	.544
Boston	36	34	.514
Philadelphia	28	37	.431
Washington	29	40	.420
St. Louis	19	47	.288

NATIONAL LEAGUE

	W.	L.	Pct.
New York	47	19	.712
St. Louis	39	29	.574
Pittsburgh	40	32	.556
Chicago	38	31	.551
Brooklyn	31	36	.463
Cincinnati	31	39	.443
Philadelphia	29	39	.426
Boston	20	50	.286

Many boys are interested in the big league baseball teams. They watch the standing of the teams from day to day. The standing of the teams in both the National League and the American League is shown here just as in a newspaper.

1. What team was leading the National League when the table was made?

2. What team was leading the American League?

3. What per cent of its games had the Pittsburgh team won? (The percentage is carried out to thousandths to show finer differences.)

4. Find Cincinnati's percentage of games won to the nearest hundredth.

END-OF-MONTH SALE**B. C. Hatton & Sons****Thursday, Friday, and Saturday**

	Sale Price
Boys' \$1.25 Gym Shoes.....	50¢
Boys' \$3.50 Oxfords.....	\$2.45
Boys' \$2 Wool Knickers.....	\$1.50
Men's 15¢ Handkerchiefs.....	12¢
Men's \$3 Dress Gloves	\$1.65
Men's \$5 Wool Sweaters.....	\$3.00
Boys' \$1.50 Skating Hose, 100% Wool	50¢

1. The boys' gym shoes in the above "ad" are usually sold for \$1.25. What per cent are they reduced in price at this sale?

$$\$1.25 - \$.50 = \$.75$$

← Amount reduced

$$\frac{.75}{1.25} = \frac{3}{5} = 60\%$$

← Per cent reduced

Make a table like the one below and write what per cent each of the other articles is reduced.

Article	Per Cent Reduced
2. Boys' Oxfords.....	_____
3. Boys' Wool Knickers.....	_____
4. Men's Handkerchiefs.....	_____
5. Men's Dress Gloves.....	_____
6. Men's Wool Sweaters.....	_____
7. Boys' Skating Hose.....	_____

8. Are the articles all reduced the same percentage? If not, what is reduced most? Least?

196 **Finding What Per Cent One Number
Is of Another**



1. Charles raises chickens. Early in the spring he set 3 hens, one with 11 eggs, another with 14 eggs, and a third with 15 eggs. Three weeks later he found he had 32 little chickens. What per cent of the eggs hatched?

2. Ethel had \$12. She bought a sweater for \$3. What per cent of her money did the sweater cost?

3. There were 20 problems in the arithmetic test. Lucille solved 12 of them correctly. What per cent of the problems did she solve correctly?

4. Four of the 24 boys in the sixth grade had perfect records in spelling last month. What per cent of 24 is 4?

5. Eight of the forty-eight children in our club cannot go on the picnic. What per cent cannot go?



6. Bob had 90 tomato plants in his garden last summer. Fifteen of the plants were broken down by a storm. What per cent of Bob's tomato plants were broken down by the storm? In what two ways could you find what per cent was left?

THESE WILL MAKE YOU THINK

1. Find $16\frac{2}{3}\%$ of 60. 40 is what per cent of 60?



2. John has 72 chickens. Twenty-seven are Plymouth Rocks. What per cent are Plymouth Rocks?

3. Eighteen of John's chickens are white Leghorns. What per cent are white Leghorns?

4. Katharine, John's sister, has a flower garden. She has 6 rows of asters, 4 rows of marigolds, and 10 rows of sweet peas.

(a) What per cent of the rows is planted in asters?

(b) What per cent in marigolds?

(c) What per cent in sweet peas?



5. Saturday Katharine picked 9 bunches of sweet peas and sold 6 of the bunches at her road stand. What per cent did she sell?



6. Katharine sells apples for her father at the road stand. On Friday she sold 8 bu. On Saturday she sold 75% more than on Friday. How many bushels did she sell on Saturday?

7. Katharine took in \$22.80 on Saturday. She gets 5% of the receipts for her work. This means she gets 5% of what she takes in. What did she earn for herself on Saturday?



ALBERT STARTS IN BUSINESS

Albert wants to be a business man when he grows up. He lives in Chicago near Wrigley Field, the Cubs' baseball park, and he sells apples, candy bars, and chewing gum to people who attend the games.

Albert knows the **cost** of each article; that is what he paid for it. He fixes a **selling price** for each article; that is what he will sell it for. He knows the **amount of profit**; that is the number of cents he makes on each article. And he figures what per cent the profit is of the cost.

This is the way he figures the amount of profit on a package of chewing gum.

$$\$.05$$

← Selling price per package

$$.03$$

← Cost per package

$$\$.02$$

← Profit per package

This is the way he figures the **per cent of profit** on a package.

$$\frac{.02}{.03} = \frac{2}{3}$$

← Profit shown by a fraction

$$\frac{2}{3} = 66\frac{2}{3}\%$$

← Profit shown in per cent

The per cent of profit may be based on the cost.

HOW ALBERT FIGURED PROFIT

1. One afternoon Albert sold 22 apples at 5¢ each. They cost him 4¢ each.

- What was the selling price of the 22 apples?
- What did they cost? (c) What was his profit?
- What was the per cent of profit?
- Is the per cent of profit on 1 apple the same as that on 22 apples? Prove it.

2. That day he sold 15 candy bars at a nickel apiece. He bought them at the rate of 3 for 10¢.

- Find the selling price of the 15 bars.
- What did they cost? (c) What was the profit?
- What was the per cent of profit?
- What is the shortest way to find his per cent of profit?

3. Albert bought chewing gum at 3¢ a package and sold it for 5¢ a package. He sold 12 packages.

- What was the selling price of the 12 packages?
- What did they cost? (c) What was his profit?
- Find the per cent of profit in the shortest way.

4. Now we shall figure up the day's business. In a table like the one below write what is called for.

Articles		Selling Price	Cost	Profit
(a)	22 apples			
(b)	15 candy bars			
(c)	12 packages gum			
Total Profit				

5. What was Albert's total profit for the afternoon, that is, the sum of his profits?

WHAT IS OVERHEAD? WHAT IS NET PROFIT?

Albert made a pretty large per cent of profit. He made such a large percentage partly because he had no rent to pay. He had no clerk to pay. He had no electric light bill, nor fuel, nor delivery service to add to his expense. The cost of such things as rent, clerk hire, heat, light, and delivery service is called **overhead**. The cost of these things should be added to the cost of the goods to get the total cost.

Apples may cost a grocer 3¢ apiece. If his overhead is $\frac{1}{2}$ ¢ on an apple, his total cost of an apple will be $3\frac{1}{2}$ ¢. If he sells the apples at 5¢ each, he has a **net profit** of $1\frac{1}{2}$ ¢ on an apple. The net profit is what he makes clear of all expenses.

$3\text{¢} + \frac{1}{2}\text{¢} = 3\frac{1}{2}\text{¢}$	← Total cost
$5\text{¢} - 3\frac{1}{2}\text{¢} = 1\frac{1}{2}\text{¢}$	← Net profit

1. The grocer's net profit, $1\frac{1}{2}$ ¢, is what per cent of the cost, $3\frac{1}{2}$ ¢?

$1\frac{1}{2}\text{¢} = \$.015$	$3\frac{1}{2}\text{¢} = \$.035$
$\frac{.015}{.035} = \frac{15}{35} = \frac{3}{7} = .42\frac{6}{7}$	

The net profit was $42\frac{6}{7}\%$ of the cost.

2. The grocer may figure his profit as part of the selling price. $1\frac{1}{2}$ ¢ is what per cent of 5¢?

$1\frac{1}{2}\text{¢} = \$.015$	$5\text{¢} = \$.050$
$\frac{.015}{.050} = \frac{15}{50} = \frac{3}{10} = .30$	

The net profit was 30% of the selling price.

3. A merchant buys potatoes at \$1.50 a bushel. His overhead amounts to \$.10 a bushel. He sells the potatoes at \$1.75 a bushel. What is the per cent of profit on cost? On selling price?

Copy this table. In each example find the per cent of profit on the cost and on the selling price.

Example	Total Cost	Selling Price	Per Cent of Profit on	
			Cost	S. P.
4.	\$5.00	\$6.00	_____	_____
5.	\$1.50	\$2.00	_____	_____
6.	\$3.00	\$3.75	_____	_____
7.	\$40.00	\$48.00	_____	_____

Finding the Per Cent of Loss

Sometimes one loses money in selling things.

1. Lucille's father bought a used Ford for \$150. He needed money to pay taxes, so he sold the car for \$120. What per cent did he lose?

$$\$150 - \$120 = \$30$$

← Money lost

$$\frac{30}{150} = \frac{1}{5}$$

← Fractional part lost

$$\frac{1}{5} = 20\%$$

← Per cent lost

The per cent of loss is based on the cost.

What is the per cent of loss on:

2. A knife bought for 25¢ and sold for 15¢?

3. A watch bought for \$5 and sold for \$2.50?

4. A rabbit bought for 50¢ and sold for 45¢?

COMPARING FOOD PRICES

People are always interested in the retail prices of foods. They want to know whether food prices are going up or coming down. On the next page is a table from a government report showing how the prices of some common foods changed between March 27, 1934, and March 26, 1935.

This table shows you the price of the food on each of the dates mentioned and gives you the per cent of increase in the prices of some of them. For example, milk was 11.1¢ a quart in March, 1934, and 11.9¢ in March, 1935. The increase was .8¢ or 7.2% above the price in March, 1934.

1. Find the percentage of increase in the price of each of the following foods:

- | | |
|-----------------|----------------------|
| (a) Cheese | (d) Whole smoked ham |
| (b) Round steak | (e) Breast of lamb |
| (c) Pork chops | (f) Eggs |

2. Pick out the five foods mentioned in the table that increased most in price.

3. Make a list of all the items in the table, and arrange the list in the order of percentage of increase in price. Begin with the one having the least percentage of increase.

4. The foods mentioned in the table are divided into six groups or kinds. Compare the increase in prices of meats with the increase in prices of the dairy products and bread. Which was greater?

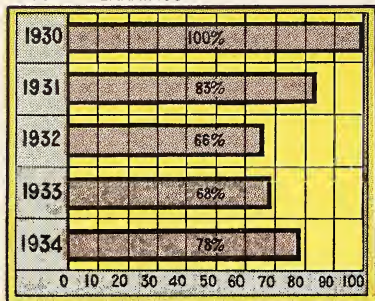
Here is the table from a government report showing changes in some food prices in 1934 and 1935.

CHANGES IN CITY RETAIL PRICES

Kind of Food	Mar. 27, 1934	Mar. 26, 1935	Change in year
<i>Dairy products</i>	¢	¢	%
Milk, qt. (Grade A delivered)	11.1	11.9	+7.2
Cheese, lb.	24.2	26.1	
Butter, lb.	30.7	36.9	+20.2
<i>Beef</i>			
Round steak, lb.	25.1	35.5	
Rib roast, lb.	20.7	29.6	+43.0
Chuck roast, lb.	15.2	23.0	+51.3
<i>Pork</i>			
Chops, lb.	24.1	32.1	
Lard, lb.	10.3	18.7	+81.6
Whole smoked ham, lb.	18.5	26.3	
<i>Lamb</i>			
Leg of lamb, lb.	25.1	27.5	+9.6
Breast of lamb, lb. . . .	10.8	13.5	
Square chuck, lb.	18.0	21.4	+18.9
<i>Poultry and Eggs</i>			
Hens, lb.	24.4	28.6	+17.2
Eggs, doz.	24.6	28.0	
<i>Bread</i>			
White, lb.	8.0	8.3	+3.8
Rye, lb.	8.6	8.9	+3.5
Whole Wheat, lb.	8.6	9.0	+4.7

CAN YOU TELL WHAT THEY MEAN?

WEEKLY EARNINGS



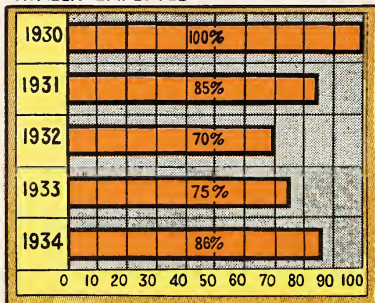
During the years from 1929 to 1935, there was much talk about hard times. Many people could not find jobs. This graph tells how the earnings of factory workers changed between 1930 and 1934.

1. What per cent did the earnings of factory workers drop from 1930 to 1932?

2. What per cent did the earnings of these same workers increase from 1932 to 1933?

3. What was the increase between 1932 and 1934?

NUMBER EMPLOYED



This graph tells how the number of employed factory workers changed during the same years.

4. What per cent did the number of those employed by factories drop between 1930 and 1932?

5. What per cent did employment in factories increase between 1932 and 1934?

6. In 1934 what per cent was factory employment below the level of 1930?



The Standing			
Teams	W.	L.	Pct.
Northwestern	6	0	1.00
Minnesota	3	1	—
Ohio State	3	1	—
Purdue	2	1	—
Illinois	3	2	—
Michigan	3	2	—
Wisconsin	1	4	—
Indiana	1	4	—
Chicago	0	3	—
Iowa	0	4	—



One of the daily newspapers published this table showing the standing of the college basket ball teams in the "Big Ten" near the middle of the season. The percentages have been omitted.

Under "W" is the number of games won; under "L" is the number lost. Northwestern has won 6 games, out of 6 played.

Find the per cent of games won by each of the other teams. Write the decimals that are equal to the per cents as the newspapers do. Can you do these without using paper and pencil?

- | | | | |
|-----------------|------|--------------|---|
| 1. Northwestern | 1.00 | 6. Michigan | — |
| 2. Minnesota | — | 7. Wisconsin | — |
| 3. Ohio State | — | 8. Indiana | — |
| 4. Purdue | — | 9. Chicago | — |
| 5. Illinois | — | 10. Iowa | — |

NAMING TWO THINGS TO DO

When there are two things to be done in working a problem, can you tell what they are? This test will help you find out if you can. Your teacher will give you time to try all the problems. Write the answers on your paper.

Read each problem carefully, then write what you would do first and what you would do next. There are two things to do in each problem.

1. Hal earned \$5.75 in regular pay one week, and \$1.25 working extra time. He used \$2.60 of this money for shoes. How much of his pay was left?

2. How many 8-inch arm bands can be cut from 10 yards of ribbon?

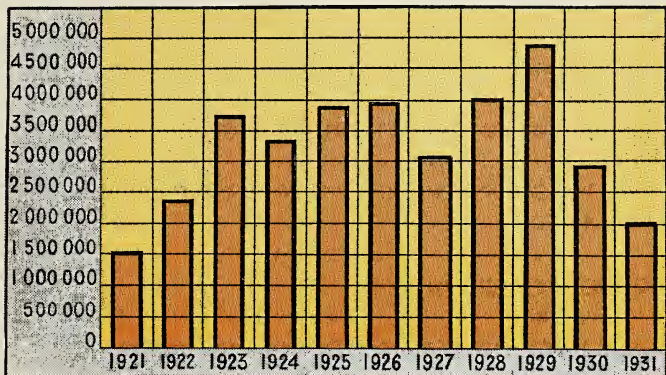
3. Carrie's mother gives her 50¢ a week. Last week Carrie spent 5¢ a day for ice cream bars. How much did she have left at the end of the week?

4. The soap we use costs 6¢ a bar, or 60¢ for a dozen bars. Find the difference in cost for a dozen bars bought one at a time and a dozen bought all at once.

5. Sam drives a delivery wagon on Saturdays. Last month he worked as follows on four Saturdays: $3\frac{1}{2}$ hr., $2\frac{1}{4}$ hr., $4\frac{3}{4}$ hr., and $2\frac{2}{3}$ hr. He gets 20¢ an hour. How much did he earn in that way last month?

If you made mistakes in this test, give more time after this to the question, "What is to be done?" If you can answer this question correctly after reading a problem, you can do the hardest thing in problems.

Below is a bar graph showing the number of automobiles (passenger cars) made in the United States each year from 1921 to 1931.



AUTOS MADE IN THE UNITED STATES

1. About how many more cars were made in 1924 than in 1921? About what per cent more?
2. In which year were the most cars made? About how many were made that year?
3. The number of cars made in 1931 was about what per cent of the number made in 1929?
4. The years 1921 and 1931 were hard-times years. What do you notice about the number of cars made during those years?
5. Estimate the number of cars made in the eleven years from the beginning of 1921 to the end of 1931.
6. Were all these cars sold in the United States?



Each Horse represents 2 Million Horses

HORSES ON OUR FARMS

On this page you have a graph about horses. As more and more automobiles are used, would you expect more or fewer horses to be raised? Look at the above graph and see if your answer is correct.

1. How many million horses were on farms in this country in 1921? In 1933?

2. From 1921 to 1933 there was a decrease of how many horses? What was the per cent of decrease?

3. What per cent of the number of horses on farms in 1912 was the number of horses on farms in 1933?

4. How do you explain the increase in the number of horses on farms during the years 1915 through 1918, the period of the World War?

Graph used by permission of Professor C. O. Thompson, University of Chicago.



ELECTRICAL APPLIANCES IN USE IN 1934

An electrical appliance is something, such as a washing machine, run by electricity. A row of houses across the graph stands for all the homes that have electricity. Those in which an electrical appliance is used are colored red.

1. In what per cent of all these homes are vacuum cleaners used?
2. What per cent have electric clocks?
3. What per cent have electric percolators?
4. Estimate the per cent of the homes in which electric irons are used.
5. Estimate the per cent having electric refrigerators.



REDUCED PRICES AT STORES

Stores often sell goods at a **discount**. This means that they take something off the regular price, for example, 10% off, 33 $\frac{1}{3}$ % off, or 50% off.

1. Jeannette's mother liked a fur coat that she saw in a show window. The regular price was \$150. It was marked 50% off. What was the selling price of the coat?

$.50 \times \$150 = \75	←Discount
$\$150 - \$75 = \$75$	←Selling price

2. A piece of Chinese silk had been priced at \$.80 a yard. At a sale it was reduced 25%. What was the sale price for a yard?

3. Edward went down to the business district to buy a cap. He saw a sign reading, CAPS 20% OFF. He bought a cap that had been priced at \$1.25 before prices were reduced. What was the reduced price?

Find the selling price.

Article	Regular Price	Discount	Selling Price
4. Book	\$1.40	50%	_____
5. Dress	\$4.98	33 $\frac{1}{3}$ %	_____
6. Radio	\$85.00	40%	_____
7. Tam	\$.60	15%	_____
8. Shoes	\$3.48	8 $\frac{1}{3}$ %	_____
9. Gloves	\$1.36	25%	_____
10. Rubbers	\$.90	10%	_____

11. Jim and his father went shopping for a new radio. The one they wanted could be bought for \$19.80 on time payments, or 10% off for cash. How much cash would be needed to buy this radio?

12. Last month Mrs. Avery bought a vacuum cleaner. The price was \$50 if she paid \$5 down and \$5 a month till the bill was paid. If she paid cash, she would be given a discount of 10%. What was the cash price?

13. Roy's father bought a set of books. The price was \$12.40, with 5% off for cash within 30 days. How much was the price reduced if he paid cash within 30 days?

14. Our electric light bill for April was \$4.20. If we pay the bill before the 25th of the following month, we get a discount of 5%. Is this discount worth bothering about? How much will the discount amount to?

FARMERS' NATIONAL BANK

2½% ON SAVINGS

INTEREST PAID ON SAVINGS

Do you have a **savings account** at a bank? At many banks a boy or girl can start a savings account with a **deposit** as small as a dollar. When you put your money in a bank, we say you deposit it. After you have done this we say, in business language, that you have an account at this bank.

Why does anybody deposit his savings in a bank? One may deposit his savings in a bank because he thinks it is a safer place than his pocket, or because he thinks he will be less likely to spend it. But these are not the only reasons. One of the best reasons is that the bank pays for the use of the money deposited. What it pays is called **interest**. Banks in many parts of our country pay 2½% interest on savings. This means 2½% a year.

1. Ruth has \$25 in a savings account in the Farmers' National Bank. The bank pays 2½% interest. How much money in interest should this bank add to Ruth's account at the end of the year?

$$.025 \times \$25 = \$.625 \quad \leftarrow \text{Interest}$$

2. Joe has saved \$20 in a bank that pays 2% interest. How much interest should he get in a year?

3. Howard's father has \$860 on deposit. Find the interest on his savings for one year at 2½%.



A SIXTH GRADER'S DEPOSIT BOOK

Below is a page from Dick's **deposit book**. A deposit book is a little record book which a bank gives you when you open an account.

Date	Year	Withdrawals	Deposits	Balance
July 1	1931		68.00	

When Dick deposits money, it is put down under "Deposits." When he draws money out of the bank, it is put down under "Withdrawals." What he has left in the bank is shown under "Balance."

Most banks pay interest **semiannually** (every 6 mo.) instead of **annually** (every year). This is better for the **depositor**. Do you know why? If the interest is left in the bank, it is added to the deposit and at once begins to earn more interest.

LEARN TO FIGURE INTEREST

1. Dick deposited \$68 savings in the bank on July 1. The bank paid interest on savings accounts at the rate of 2% a year. How much interest would be due in six months?

$$.02 \times \$68 = \$1.36$$

← Interest for 1 year

$$\frac{1}{2} \times \$1.36 = \$.68$$

← Interest for $\frac{1}{2}$ year

Find the interest:

2. On \$450 for 6 months at 4%.
3. On \$2000 for 6 months at 3%.
4. On \$180 for 1 yr. 6 months at 2%.
5. On \$600 for 1 yr. 4 months at 3%.

Who Besides Banks Pay Interest?

So far we have been solving problems in which a bank pays interest. Banks also lend money and charge interest. If a bank lends you money, you pay the interest to the bank when you borrow the money. Suppose the rate of interest is 6%, a rate often charged by banks. If you borrow \$100 from the bank for 60 days, the bank will charge you for $\frac{1}{6}$ yr., or \$1, as interest. You will pay this interest when you get the loan.

You may also borrow money from a friend. You will pay the interest when you pay the loan.

What is the interest:

6. On \$50 for 1 yr. at $7\frac{1}{2}\%$?
7. On \$60 for 1 yr. 6 mo. at 5%?
8. On \$300 for 1 yr. 3 mo. at 6%?
9. On \$100 for 6 mo. at 8%?

FINDING OUR WEAK SPOTS

Your teacher will give you time to try all the examples in this test. If you make mistakes in any row, she will have you do others of the same kind in the row of the same number on the next page. When she finds a place where you are having trouble, she will sometimes have you do the work out loud for her.

Finding a Per Cent of a Number

1. 10% of \$80 = ? 25% of \$8 = ? 40% of \$6 = ?
2. $8\frac{1}{3}\%$ of \$60 = ? $12\frac{1}{2}\%$ of \$16 = ? $33\frac{1}{3}\%$ of \$300 = ?

Finding Prices of Goods Sold at a Discount

3. (a) Hat reduced 15% from \$2.60.
(b) Dress reduced 20% from \$5.75.
(c) Suit reduced $16\frac{2}{3}\%$ from \$18.

Finding the Per Cent One Number Is of Another

4. (a) What per cent of 8 is 2?
(b) What per cent of 25 is 6.25?
(c) 20 is what per cent of 50?

Finding the Per Cent of Profit on Entire Cost

5. (a) Entire cost, \$1.75; selling price, \$2.10.
(b) Entire cost, \$200; selling price, \$210.
(c) Entire cost, 60¢; selling price, 65¢.

Finding the Per Cent of Increase or Decrease in Food Prices

6. (a) Apples changed from 6.0¢ to 5.7¢ a pound.
(b) Oranges changed from 27.5¢ to 29.7¢ a dozen.
(c) Corn changed from 14.0¢ to 16.1¢ a can.

CURING OUR WEAK SPOTS

The test on page 215 was given to show the kinds of percentage examples, if any, that give you trouble, and why they give you trouble. Now you have a chance to learn how to do the trouble-makers and show your teacher you have no more trouble with them.

Finding a Per Cent of a Number

1. 32% of \$50 = ? 5% of \$75 = ? 20% of \$15 = ?
2. $66\frac{2}{3}\%$ of \$30 = ? $37\frac{1}{2}\%$ of \$40 = ? $62\frac{1}{2}\%$ of \$80 = ?

Finding Prices of Goods Sold at a Discount

3. (a) Overcoat reduced 20% from \$12.
(b) Dress reduced 25% from \$18.
(c) Shoes reduced $33\frac{1}{3}\%$ from \$4.50.

Finding the Per Cent One Number Is of Another

4. (a) What per cent of 48 is 8?
(b) What per cent of 150 is 15?
(c) 18 is what per cent of 24?

Finding the Per Cent of Profit on Entire Cost

5. (a) Entire cost, 20¢; selling price, 22¢.
(b) Entire cost, \$1.60; selling price, \$2.00.
(c) Entire cost, \$500; selling price, \$530.

Finding the Per Cent of Increase or Decrease in Food Prices

6. (a) Flour changed from 4.8¢ to 6.0¢ a pound.
(b) Onions changed from 4.5¢ to 7.2¢ a pound.
(c) Peas changed from 16.0¢ to 16.8¢ a can.

CHAPTER VII

USING WHAT YOU LEARN

Talking about Large Numbers



AT THE HOLLYWOOD BOWL

Dorothy Scott told about some trips in California that she and Robert took with their parents.

Dorothy said, "We drove to the Hollywood Bowl one day. I saw a crowd of about 20,000 people there. It seemed every seat was taken."

Jane said, "I went to the Pasadena Rose Bowl to see a football game on New Year's Day. There were about 80,000 people there."

"Eighty thousand people! That's four times as many as 20,000," said Jack.

1. Have you ever seen 20,000 people in a crowd at one time? Tell the class where you saw them.

2. Have you ever been in a crowd of 100,000 or more people? If you have, tell the class where you were.

HOW WE USE LARGE NUMBERS

When we read large numbers or talk about large numbers, we should try to think of them clearly. Read 1, 2, and 3 below.

1. The sixth grade in the Edison school has 50 pupils. Can you think of a crowd of 100 pupils on the playground? About how many pupils have you seen on a playground at one time?

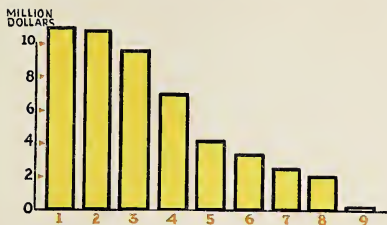
2. The town of Clifton has several playgrounds. Last year these playgrounds were used by 5,000 different children. In the spring the playground director had a play festival in which the 5,000 children took part. Can you think of 5,000 children in a crowd?

3. Lois and her mother stayed in one of the largest hotels in the United States. The hotel has 3,000 rooms for guests. If each room had two persons staying in it, there would be 6,000 guests in the hotel. That is a larger number than all the people living in some small cities. How many people live in your city?

Larger numbers are used in the paragraphs below. You cannot picture numbers as large as these in your mind.

4. One of the large railway systems in the United States has 8,457 miles of track. In one year this company received \$102,270,339 from those who shipped goods or traveled on the trains.

5. The same railway company paid \$85,162,948 for operating expenses in that year. This amount was \$17,107,391 less than the company received during the year for passenger fares and freight.



This graph will help you to think of amounts of money that are too large to picture in your mind.

1. In this graph there is a column for each of the amounts of money shown below. Which column stands for \$4,000,000? Find the column for each of the other amounts in the same way.

\$4,000,000	\$2,200,000
\$7,000,000	\$2,000,000
\$3,000,000	\$10,800,000
\$9,500,000	\$11,000,000
\$200,000	

2. On the playgrounds in the town of Clifton the weekly attendance for ten weeks in the summer was as follows: first week, 1,500 children; second week, 2,000 children; third week, 2,500; fourth week, 1,000; fifth week, 2,000; sixth week, 3,500; seventh week, 3,000; eighth week, 2,000; ninth week, 3,000; and tenth week, 3,500.

Make a graph like the one above, showing the playground attendance in Clifton during the ten weeks.

3. Look in books, newspapers, and magazines for graphs that show large numbers. Bring one to the class. Show what it means.



THEIR STANDING IN ARITHMETIC

We have used the line graph to show changes in the price of groceries and other things. It is often used to show changes in the standing of a pupil or a class in school work.

The graph on this page shows the scores made by David and his class in ten tests. The yellow line shows David's arithmetic scores. The red line shows the average scores of the class.

1. Write what you would say if you were telling somebody what this graph shows.

2. What was David's score on the first test? On the last test?

3. On what test did David get the highest score? The lowest score?

4. Write the numbers of the tests on which David stood above the average. Write the numbers of the tests in which he stood below the average.

5. Was David's improvement (gain), as shown by his scores on the first and tenth tests, greater or less than the average of his class? How much?

IN THE CANAL ZONE

Donald's family is moving to the Panama Canal Zone for one year. His father is going to take care of the company's business there.

Donald has been reading about the Canal Zone. His teacher asked him to tell the class some of the things he has learned.

1. Donald told the class about the number of ships that pass through the canal. During three years in which the number of ships was large, the record showed for the first year 5,085 ships, for the second year 6,334 ships, and for the third year, 6,430 ships. How many ships passed through the canal in these three years?

2. The Canal Zone is a belt of land extending 5 miles on each side of the canal. The population of this zone is 39,467. Of these people 8,066 are from the United States. How many people in the Canal Zone are not from the United States?

3. Donald found that there are 2,758 children among the people from the United States. There are 8,604 other children in the Canal Zone. What is the total number of children there?

4. Add and check.

1651	7230	4825	22152	6168	38458
<u>89</u>	<u>596</u>	<u>5378</u>	<u>9274</u>	<u>5379</u>	<u>19351</u>

5. Subtract and check.

9512	6446	12135	28412	46915	33781
<u>7106</u>	<u>5339</u>	<u>11956</u>	<u>19170</u>	<u>23488</u>	<u>15084</u>

222 Adding Whole Numbers and Decimals

WATCHING TWO DANGER SPOTS

Dick has no trouble in adding and subtracting whole numbers, but he has trouble with decimals when the numbers are not the same length.

1. Dick read a notice that the state highway commission is taking bids on the construction of concrete roads. Two long pieces of new road will be built, one 150.7 miles in length and the other 256 miles. Shorter pieces of road will be built in other parts of the state, as follows: 80.6 miles, 49.2 miles, .9 mile, and 6.75 miles. How many miles of road will be made?

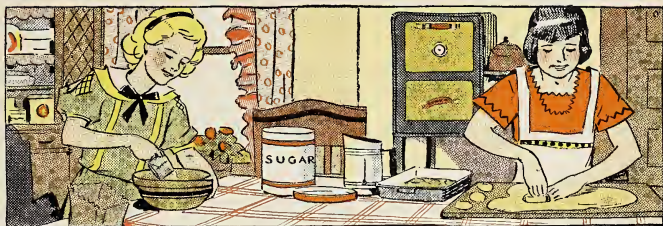
2. Ruth has trouble in adding long columns. It is hard for her to remember each sum and add a new number to it.

Add the numbers in the example at the right. Say each sum as you add.

To help you where Dick and Ruth had trouble, copy and add the numbers in each example below.

58
29
98
99
67
85
77
<u>89</u>

3. 59, 86, 34, 86, 104, 29, 2.
4. \$7.47, \$236, \$158.47, \$64.88, \$.70.
5. 94, 39, 38, 65, 27, 35, 29, 74.
6. 100.7, 3.74, 132, 6.89, 4.63, 4.67, 87.009.
7. 281.88, 74.9, 6.7, 397.27, 11.92, 68.4.
8. 637, 46, 59, 78, 372, 69, 39, 81.
9. 48, 69, 284, 86, 440, 755, 67, 98.
10. 6.5, 48.375, 16.9, 25, 87, 3.582.



MAKING COOKIES AT JEAN'S HOME

1. Jean and Margaret made cookies yesterday at Jean's home. Jean used $1\frac{1}{3}$ cups of sugar for her cookies and Margaret used $\frac{3}{4}$ cup of sugar for hers. How much sugar did the two girls use?

2. How much more sugar did Jean use than Margaret used?

3. Bob rides 3 blocks on his bicycle while Jean rides 2 blocks on hers. They start together. When Jean has gone 1 block, how far ahead of her is Bob?

Add.

$$\begin{array}{r} 3. \quad 4\frac{1}{8} \\ \quad \quad \frac{5}{8} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{3} \\ 5\frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{8} \\ \frac{3}{12} \\ \hline \end{array} \quad \begin{array}{r} 9\frac{2}{6} \\ 3\frac{1}{4} \\ \hline \end{array} \quad \begin{array}{r} 6\frac{2}{5} \\ 10\frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} 12\frac{3}{4} \\ 7\frac{2}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 8\frac{5}{6} \\ 4\frac{1}{2} \\ 9\frac{5}{8} \\ \hline \end{array} \quad \begin{array}{r} 11\frac{1}{2} \\ 7\frac{3}{4} \\ 6\frac{3}{4} \\ \hline \end{array} \quad \begin{array}{r} 5\frac{7}{12} \\ 9\frac{2}{3} \\ 7\frac{3}{8} \\ \hline \end{array} \quad \begin{array}{r} 10\frac{2}{3} \\ 21\frac{7}{15} \\ 8\frac{2}{3} \\ \hline \end{array} \quad \begin{array}{r} 3\frac{7}{10} \\ 2\frac{4}{5} \\ 6\frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} 22\frac{3}{7} \\ 1\frac{2}{3} \\ 9\frac{1}{3} \\ \hline \end{array}$$

Subtract.

$$\begin{array}{r} 5. \quad 2\frac{3}{5} \\ \quad \quad 1\frac{3}{5} \\ \hline \end{array} \quad \begin{array}{r} 5\frac{1}{4} \\ 1\frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} 8\frac{1}{8} \\ 3\frac{5}{8} \\ \hline \end{array} \quad \begin{array}{r} 13\frac{17}{20} \\ 11\frac{4}{5} \\ \hline \end{array} \quad \begin{array}{r} 9\frac{1}{2} \\ 6\frac{1}{6} \\ \hline \end{array} \quad \begin{array}{r} 6\frac{2}{3} \\ \frac{5}{6} \\ \hline \end{array}$$

FINDING OUR WEAK SPOTS

Do each example on this page, then check your work. Checking the subtraction in rows 3 and 4 will be part of your test in addition. Show all your work in rows 3 and 4.

1. Whole numbers and decimals. Find sums.

4160	4807	9385	30.6	\$ 67.75
1986	3059	5467	800.08	4.98
5847	163	8579	7.9	40.25
<u>8998</u>	<u>6086</u>	<u>9858</u>	<u>46.03</u>	<u>166.59</u>

2. Whole numbers and decimals. Find remainders.

4302	7698	8010	45.3	\$100.05
<u>3220</u>	<u>4243</u>	<u>2099</u>	<u>38.57</u>	<u>9.76</u>

3. Fractions. Find remainders.

$\frac{9}{10}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{4}{5}$
<u>$\frac{3}{5}$</u>	<u>$\frac{3}{8}$</u>	<u>$\frac{3}{5}$</u>	<u>$\frac{1}{5}$</u>	<u>$\frac{2}{3}$</u>	<u>$\frac{3}{8}$</u>	<u>$\frac{3}{10}$</u>

4. Mixed numbers. Find remainders.

$12\frac{1}{2}$	$7\frac{3}{4}$	18	$9\frac{3}{10}$	$37\frac{1}{2}$
<u>$3\frac{1}{3}$</u>	<u>$2\frac{3}{5}$</u>	<u>$9\frac{1}{2}$</u>	<u>$4\frac{1}{2}$</u>	<u>$16\frac{2}{3}$</u>

5. Do what the signs tell you to do.

(a) $\$10 - \$3.45 = ?$ (b) $18\frac{5}{8} \text{ mi.} + 17\frac{7}{8} \text{ mi.} = ?$
 (c) $1\frac{1}{2} - \frac{7}{8} = ?$

CURING OUR WEAK SPOTS

If you made mistakes in any row of the test on page 224, do the examples in the row of the same number on this page and check. Show all your work in rows 3 and 4.

1. Whole numbers and decimals. Find sums.

3524	8072	6953	70.08	\$ 34.25
2639	3367	5887	380.5	2.49
3746	5492	3025	1.07	60.95
<u>2477</u>	<u>6285</u>	<u>4768</u>	<u>404.3</u>	<u>299.76</u>

2. Whole numbers and decimals. Find remainders.

7126	2101	8427	97.	\$400.85
<u>4689</u>	<u>2092</u>	<u>786</u>	<u>.007</u>	<u>379.95</u>

3. Fractions. Find remainders.

$\frac{2}{5}$	$\frac{4}{5}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{3}{4}$
$\frac{3}{8}$	$\frac{3}{10}$	$\frac{7}{15}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{2}{5}$

4. Mixed numbers. Find remainders.

$6\frac{4}{5}$	$13\frac{1}{3}$	21	$8\frac{1}{2}$	$24\frac{2}{3}$
<u>$2\frac{3}{4}$</u>	<u>$5\frac{1}{2}$</u>	<u>$8\frac{2}{5}$</u>	<u>$4\frac{9}{10}$</u>	<u>$15\frac{4}{5}$</u>

5. Do what the signs tell you to do.

(a) $\$30 - \$7.25 = ?$ (b) $16\frac{1}{2} \text{ ft.} + 89\frac{3}{4} \text{ ft.} = ?$
(c) $3\frac{3}{8} - 2\frac{5}{8} = ?$



Read each problem carefully and tell whether you should add or subtract. If you should do both, tell which you should do first. Then solve the problem.

1. Ralph bought a cap for 75¢, a pair of shoes for \$3.90, and a sweater for \$1.75. He handed the clerk two \$5 bills to pay for these things. How much change should the clerk give him?

2. Carol read in the paper that the rainfall on April 30 was .75 of an inch. She saw that the rainfall for the other 29 days in the month amounted to 2.9 inches. What was the total rainfall for the month?

3. Both Sue and her mother are making dresses. Sue's pattern calls for $2\frac{1}{2}$ yards of cloth. Her mother's pattern calls for $3\frac{1}{4}$ yards of cloth. How many yards less will Sue need than her mother?

4. When Louis and his father left home, the speedometer read 12,525 miles. They drove 5.8 miles on a gravel road and then drove to Adrian on Highway 40. At Adrian the speedometer read 12,536.3 miles. How far did they drive on Highway 40?

5. Subtract and check.

\$100.	7.921	436.2	\$22.15	342.11
<u>79.65</u>	<u>.83</u>	<u>9.785</u>	<u>9.48</u>	<u>20.066</u>

DO THESE TROUBLE YOU?

1. Lois was multiplying 68 by 8. She knew that $8 \times 8 = 64$. She wrote 4. Next she said, " $8 \times 6 = 48$," and started to write 48 in the product. Ann said, "Add the 6 of 64." Lois tried to think how many 48 and 6 are, and Tom said 54. Lois wrote 54 in the product, making 544. Is 544 correct?

2. What two things in multiplication should Lois learn to do? Are you strong in both of them?

3. Multiply each of the following numbers by 9 and add 6 to each product:

2 6 0 3 8 4 7 1 5 9

4. Edgar was not sure where to place the decimal point in the product when he multiplied \$400 by .06. He pointed off two figures, but he thought the answer did not look right. What is the product of \$400 multiplied by .06? How did you get it?

5. In multiplying by a three-figure multiplier with zero in the middle, Ben was not careful to put each product in the right place. Multiply \$250.50 by 406.

Multiply.

6. 47	64	89	37	58	76
<u>9</u>	<u>8</u>	<u>7</u>	<u>6</u>	<u>9</u>	<u>4</u>

7. 80 ft.	2.5 mi.	.96	\$.48	400
<u>.5</u>	<u>75</u>	<u>.04</u>	<u>.20</u>	<u>.05</u>

8. 429	308	642	906	2005
<u>40</u>	<u>37</u>	<u>305</u>	<u>507</u>	<u>806</u>

A NEW WAY TO USE DECIMALS

Do you remember how to change common fractions to decimals and decimals to common fractions? In some problems it is a help to do this.

1. If Ed walks $3\frac{1}{4}$ miles an hour, how far will he walk in $2\frac{1}{2}$ hours? Solve in two ways.

One Way

$$\begin{array}{r} 3\frac{1}{4} = \frac{13}{4} \\ 2\frac{1}{2} = \frac{5}{2} \\ \frac{5}{2} \times \frac{13}{4} = \frac{65}{8} \\ \frac{65}{8} = 8\frac{1}{8} \\ \frac{65}{8} \text{ mi.} = 8\frac{1}{8} \text{ mi.} \end{array}$$

Another Way

$$\begin{array}{r} 3\frac{1}{4} = 3.25 \\ 2\frac{1}{2} = 2.5 \\ 2.5 \times 3.25 \text{ mi.} = 8.125 \text{ mi.} \\ .125 = \frac{125}{1000} = \frac{1}{8} \\ 8.125 \text{ mi.} = 8\frac{1}{8} \text{ mi.} \end{array}$$

In this problem you may change the mixed numbers to improper fractions and multiply, or you may change the mixed numbers to decimals and multiply.

Now solve problem 2 in both of these ways and tell which way is easier.

2. Jean's mother bought $9\frac{3}{4}$ yd. of cloth at \$.80 a yard. How much did the cloth cost her?

When a decimal ends in a fraction, as in problem 3, you can add, subtract, multiply, or divide, as you do in other mixed numbers.

3. John's father works in a large hardware store. He sold 150 boys' hammers to a small store at $\$16.66\frac{2}{3}$ a hundred. How much should he receive for the hammers?

4. Find the sum without changing the fractions:

$$\$3.33\frac{1}{3} + \$9.37\frac{1}{2} + \$18.12\frac{1}{2} + \$.66\frac{2}{3} = ?$$

MEETING SOME OLD FRIENDS

Lucy, Paul, and May were playing school. They were dividing 864 by 36.

$$\begin{array}{r} 2 \\ 36 \overline{)864} \\ \underline{72} \end{array}$$

$$2 \times 36 = 72$$

$$\begin{array}{r} 2 \\ 36 \overline{)864} \\ \underline{72} \\ 14 \end{array}$$

Lucy: "I think the first figure in the quotient is 2."

May: "You don't know until you find 2×36 and see if the product can be subtracted from 86."

Lucy: " $2 \times 36 = 72$. 72 from 86 = 14. Bring down the next figure and divide again."

Paul: "Do one more thing before you bring down the next figure. See if the remainder is less than the divisor. 14 is less than 36, so 2 in the quotient is right."

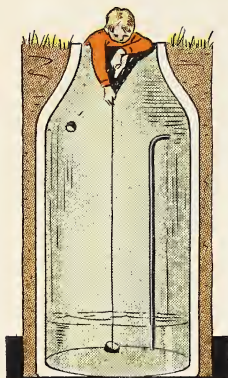
1. Finish the division above, and check.

- What do you think is the next quotient figure?
- How do you know 4 is not too large?
- How do you know 4 is not too small?

2. How many quarter hours in 6 hr. and 30 min.?

- Solve by division of mixed numbers and fractions. What fraction should you invert?
- Change both numbers in the problem to decimals, and solve by division of decimals.
- Do the two answers agree?

MACK MEASURES THE WATER



On the farm where Mack lives there is a large cistern to hold rain water. Water from the cistern is used in the house.

1. The cistern holds 3,960 gallons of water when the top of the water reaches the curve in the side. At 31.5 gallons to the barrel, how many barrels of water will the cistern hold? (Divide by decimals to the nearest tenth of a barrel.)

2. When the divisor is a decimal and the dividend is a whole number, as in problem 1, tell what you should do in the dividend before you divide.

3. Show by a caret (^) where to put the decimal point of the quotient in problem 1.

4. One day during the dry weather in 1934 Mack found the water in the cistern was only 2 feet deep. His father said it should be 10 feet deep when full. How many barrels of water were in the cistern (to the nearest tenth)?

5. When the divisor is a whole number and the dividend is a decimal, as in problem 4, tell how you know where to put the decimal point in the quotient.

Divide.

$$6. \quad 8 \overline{)403.6}$$

$$12 \overline{)228.6}$$

$$4.5 \overline{)9.09}$$

$$\$1.25 \overline{)\$10}$$

THEIR TRIP TO CAMP

Read each problem carefully. Tell what is given and what you are asked to find. Write what you must do first, second, and so on, to solve the problem. Then solve, and check each step.

1. Last summer Howard and his uncle drove 927.5 miles to their camp in two days. They averaged 35 miles an hour while driving. How many hours did they drive?

2. If Howard and his uncle had made an average of 45 miles an hour instead of 35 miles, how many hours of driving would they have done (to the nearest tenth)?

3. Howard and his uncle camped by a small lake for ten days after their two-day trip. Then they were two days driving home. If they started from home on this trip in the morning on July 27, they arrived home in the evening on what date?

4. Howard kept a record of the cost of the trip. After they reached home, he showed his uncle this record: 104 gal. gas, \$19.24; oil, \$1.50; meals on the road and groceries in camp, \$15.35; rent of row boat, \$5; other expenses, \$12.80. What was the average daily cost for each person?

5. After reaching home, Howard's uncle sold the car for \$490. This was $\frac{2}{3}$ of what it cost him two years earlier. What did the car cost Howard's uncle two years earlier? Solve in the shortest way.

6. Make a problem in which you add four money numbers and divide the sum by 5. Then solve your problem.

232 Diagnostic Tests in Multiplication and Division

FINDING OUR WEAK SPOTS

Multiplication

$$\begin{array}{r} 1. \quad 8697 \\ \quad 308 \\ \hline \end{array} \quad \begin{array}{r} 49.05 \\ \quad 86 \\ \hline \end{array} \quad \begin{array}{r} \$.33\frac{1}{3} \\ \quad 96 \\ \hline \end{array} \quad \begin{array}{r} \$1.00 \\ \quad .5 \\ \hline \end{array} \quad \begin{array}{r} .1 \\ \quad .1 \\ \hline \end{array}$$

$$2. \quad \frac{7}{8} \times \frac{2}{5} = ? \quad 8 \times 3\frac{5}{8} = ? \quad 12\frac{1}{2} \times 6\frac{1}{4} = ? \quad \frac{1}{2} \times .1 = ?$$

$$3. \quad \begin{array}{r} 18\frac{3}{5} \\ \quad 9\frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} 3\frac{3}{14} \\ \quad 1\frac{5}{9} \\ \hline \end{array} \quad \begin{array}{r} \$26.25 \\ \quad 8\frac{1}{3} \\ \hline \end{array} \quad \begin{array}{r} 264 \\ \quad .1\frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} .12\frac{1}{2} \\ \quad 16 \\ \hline \end{array}$$

$$4. \quad \begin{array}{r} 4306 \\ \quad 968 \\ \hline \end{array} \quad \begin{array}{r} 6004 \\ \quad 573 \\ \hline \end{array} \quad \begin{array}{r} 7683 \\ \quad 579 \\ \hline \end{array} \quad \begin{array}{r} 3045 \\ \quad 806 \\ \hline \end{array} \quad \begin{array}{r} 8567 \\ \quad 400 \\ \hline \end{array} \quad \begin{array}{r} 4060 \\ \quad 50 \\ \hline \end{array}$$

Division

$$5. \quad 38 \overline{)950} \quad 39 \overline{)2418} \quad 50 \overline{)\$23.00} \quad 14 \overline{)2926}$$

$$6. \quad \frac{1}{5} \div \frac{3}{4} = ? \quad \frac{4}{5} \div \frac{8}{15} = ? \quad 7 \div \frac{5}{6} = ? \quad 2\frac{2}{3} \div \frac{1}{3} = ?$$

$$7. \quad 25 \div 6\frac{1}{4} = ? \quad 200 \div 8\frac{1}{3} = ? \quad 50 \div \frac{1}{25} = ? \quad \frac{1}{2} \div 1\frac{1}{2} = ?$$

$$8. \quad 33\frac{1}{3} \div 4 = ? \quad 6\frac{1}{4} \div 5 = ? \quad \frac{1}{10} \div 10 = ? \quad 2\frac{2}{5} \div 1\frac{1}{5} = ?$$

$$9. \quad .9 \overline{)7.56} \quad 3.02 \overline{)11.476} \quad .15 \overline{)750.} \quad 4.2 \overline{)116.76}$$

If you made mistakes in any exercise on this page, do the examples in the exercise of the same number on page 233.

CURING OUR WEAK SPOTS

The exercises on this page are like those numbered the same on page 232. If you made any mistakes on that page, do the exercise of the same number on this page.

Multiplication

1. $\begin{array}{r} 7698 \\ 803 \end{array}$	$\begin{array}{r} 94.05 \\ 68 \end{array}$	$\begin{array}{r} \$.66\frac{2}{3} \\ 39 \end{array}$	$\begin{array}{r} \$10.00 \\ .05 \end{array}$	$\begin{array}{r} .10 \\ .10 \end{array}$
---	--	--	---	---

2. $\frac{1}{5} \times \frac{15}{24} = ?$ $6 \times 2\frac{5}{6} = ?$ $2\frac{1}{2} \times \frac{8}{15} = ?$ $\frac{1}{5} \times .1 = ?$

3. $\begin{array}{r} 15\frac{2}{3} \\ 6\frac{1}{3} \end{array}$	$\begin{array}{r} 5\frac{1}{16} \\ 4\frac{4}{9} \end{array}$	$\begin{array}{r} \$50.70 \\ 8\frac{1}{3} \end{array}$	$\begin{array}{r} 342 \\ 2\frac{1}{2} \end{array}$	$\begin{array}{r} .37\frac{1}{2} \\ 8 \end{array}$
---	--	--	--	--

4. $\begin{array}{r} 3064 \\ 896 \end{array}$	$\begin{array}{r} 2009 \\ 357 \end{array}$	$\begin{array}{r} 3687 \\ 390 \end{array}$	$\begin{array}{r} 4053 \\ 604 \end{array}$	$\begin{array}{r} 2657 \\ 700 \end{array}$	$\begin{array}{r} 3080 \\ 50 \end{array}$
---	--	--	--	--	---

Division

5. $28 \overline{)1008}$ $29 \overline{)1334}$ $30 \overline{)\$24.00}$ $16 \overline{)5920}$

6. $\frac{3}{8} \div \frac{5}{9} = ?$ $\frac{7}{8} \div \frac{3}{4} = ?$ $3 \div \frac{4}{5} = ?$ $7\frac{2}{3} \div \frac{4}{9} = ?$

7. $35 \div 2\frac{1}{3} = ?$ $100 \div 16\frac{2}{3} = ?$ $25 \div \frac{1}{10} = ?$ $\frac{1}{4} \div 4\frac{1}{4} = ?$

8. $87\frac{1}{2} \div 7 = ?$ $12\frac{1}{2} \div 5 = ?$ $\frac{1}{8} \div 8 = ?$ $4\frac{4}{5} \div 1\frac{3}{5} = ?$

9. $.9 \overline{)8.55}$ $2.03 \overline{)10.759}$ $.18 \overline{)270.}$ $2.4 \overline{)72.96}$

FIGURE YOUR INTEREST YOURSELF

Mr. Lane was at the bank depositing his monthly salary in his checking account. He talked with the cashier about starting a savings account with part of his money. He thought his money should be earning something for him as well as for the bank.

What is the difference between a checking account and a savings account?

1. In the evening Frank heard his father say that the bank was paying only 2% on savings. Frank asked his father what "2%" means. You tell.

2. Mr. Lane said, "2% on savings means that the bank pays you at the rate of \$2 a year for the use of each \$100 you have in your savings account." How much interest should you get if you had \$200 on deposit for 1 year? \$1000 for 1 year?

3. Frank's class in school had been studying about interest on loans. He had seen a table showing what per cent of a number is $\frac{1}{2}$ of it; $\frac{1}{3}$ of it; $\frac{1}{4}$ of it; $\frac{3}{4}$ of it; $\frac{1}{5}$ of it; $\frac{2}{5}$ of it; and $\frac{1}{8}$ of it. Can you tell what per cent is the same as each of these fractional parts?

4. If you have \$100 in a bank and draw out \$50, what part of the money do you draw out? Answer in a common fraction. Change the fraction to a decimal. Write the part as a per cent.

$$\$50 = \frac{1}{2}, \text{ or } \frac{50}{100}, \text{ or } .50, \text{ or } 50\% \text{ of } \$100.$$



TALKING THINGS OVER

1. Nan said she had seen a window sign that read, "All Goods in This Window 20% Off." Tell what this sign means. How much would you have to pay for a dress at 20% off, if the old price was \$10?

2. Marion read that food prices now average 14% higher than they averaged four years ago. What would be the cost now of a basket of groceries like one that sold for \$2 four years ago?

3. Katherine heard her father say that his coal bills for last winter amounted to $12\frac{1}{2}\%$ more than for the preceding winter. The price for a ton was the same. How much more coal had the family used? Answer in a fraction.

4. The records at school show that Lloyd weighs 64 pounds and his older brother Clarence weighs 80 pounds. How many pounds heavier than Lloyd is his brother? What per cent heavier? $\frac{16}{64} = \underline{\hspace{1cm}}\%$

5. In baseball the pitcher's box is about 60 feet from the home plate. The distance from home plate to first base, first to second, second to third, and third to home, is in each case 90 feet. The pitcher's distance from the home plate is about what per cent of the distance around the bases?

ROY TELLING JIM

You know how to change such fractions as $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{5}$ to per cents. To be quick and correct in using per cents, you should be able to change any fraction to per cent.

1. Jim had a spelling test of 25 words. He missed 6 words. What fractional part of the test did Jim miss? What per cent did he miss?

Jim knows that he missed $\frac{6}{25}$ of the words. He must change $\frac{6}{25}$ to a two-place decimal and then write the per cent.

Roy told Jim to divide 6 by 25. This is how Jim did it.

$$\begin{array}{r} .24 \\ 25 \overline{)6.00} \\ \underline{50} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

The quotient is .24.

Jim missed .24 or 24% of the words in the test.

Why divide 6 by 25?

A fraction means that the numerator is to be divided by the denominator. When you divide, you should get a decimal equal to the fraction.

2. Find the decimals that are equal to each of the following fractions. Then write the decimals as per cents.

$$\frac{3}{4}$$

$$\frac{7}{10}$$

$$\frac{3}{50}$$

$$\frac{2}{5}$$

$$\frac{9}{10}$$

$$\frac{3}{20}$$

$$\frac{8}{25}$$

In some problems when you divide the numerator of a fraction by the denominator, the quotient does not come out even at just two decimal figures. How do you finish such a problem?

3. Mike missed 5 words in a test of 40 words. What fractional part of the test did he miss? What per cent did he miss?

$$\begin{array}{r} .12\frac{1}{2} \\ 40 \overline{)5.00} \\ \underline{40} \\ 100 \\ \underline{80} \\ 20 \end{array}$$

Mike wrote the numbers Roy's way.

He began to divide to change $\frac{5}{40}$ to a decimal.

He got two quotient figures (.12), but he had 20 remainder.

Roy told him to write the remainder as a fraction.

Mike said, " $\frac{20}{40} = \frac{1}{2}$. So the quotient is $.12\frac{1}{2}$." Is that correct?

Read the quotient, "Twelve and one-half hundredths."

Mike missed $12\frac{1}{2}\%$ of the words in the test.

To stop any decimal at hundredths, you should write the remainder as a fraction.

In changing some fractions to decimals, the division will not come out even, no matter how far you divide.

4. Jane had 10 examples correct out of 12 in a test. What per cent did she have correct? $\frac{10}{12}$ equals how many hundredths? Divide to two decimal places, and write the remainder as a fraction.

$$\frac{10}{12} = \frac{5}{6}$$

$$\frac{5}{6} = .\underline{\quad} = \underline{\quad}\%$$

In reading newspapers and in talking with people you will notice that decimals are often used in making records of measurements.

Claire saw that rainfall is given in hundredths of an inch in the weather report.

1. The rainfall in Milwaukee one day was .01 of an inch. The record in Brownsville on the same day was .10 of an inch. Which place had more rain on that day, and how much more?

2. The weather report showed 2.02 inches rainfall in Shreveport on a day when Memphis had .14 of an inch. How much greater was the rainfall in Shreveport than in Memphis?

Richard lives in a town on the Mississippi river. The depth of water in the river is recorded by the United States government in tenths of a foot.

3. At a certain point along the Mississippi river "flood stage" is reached at 16 feet. When the river has risen to 8.4 ft., how much more can it rise without passing flood stage?

Ted found that some compound numbers among common measures can be written as decimals and then be added or subtracted.

4. Ted's brother wanted to know the sum of 3 bu. 3 pk. and 2 bu. 2 pk. of potatoes. He did the example as you see it below. Explain each step.

$$3 \text{ bu. } 3 \text{ pk.} = 3\frac{3}{4} \text{ bu.} = 3.75 \text{ bu.}$$

$$2 \text{ bu. } 2 \text{ pk.} = 2\frac{1}{2} \text{ bu.} = 2.5 \text{ bu.}$$

$$\text{The sum is } \rightarrow \overline{6.25} \text{ bu.}$$

$$6.25 \text{ bu.} = 6 \text{ bu. } 1 \text{ pk.}$$

5. Subtract 1 bu. 3 pk. from 4 bu. 1 pk.

LET US MAKE THESE OUR OWN

Most of us have studied the important tables before, but some of us forget. Here are the tables that you should know. Read each table carefully, then see if you can say it to yourself. It is better to carry these tables in your head than in your pocket.

COUNTING

12 units = 1 dozen (doz.)

20 units = 1 score

12 dozen = 1 gross (gro.)

DRY MEASURE

2 pints (pt.) = 1 quart (qt.)

8 quarts = 1 peck (pk.)

4 pecks = 1 bushel (bu.)

LENGTH

12 inches (in.) = 1 foot (ft.)

3 feet = 1 yard (yd.)

$5\frac{1}{2}$ yards or

$16\frac{1}{2}$ feet = 1 rod (rd.)

320 rods or

5280 feet = 1 mile (mi.)

WEIGHT

16 ounces (oz.) = 1 pound (lb.)

100 pounds = 1 hundredweight
(cwt.)

2000 pounds = 1 ton (T.)

TIME

60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
365 days or	
12 months (mo.)	= 1 year (yr.)

AREA

144 square inches (sq. in.)	= 1 square foot (sq. ft.)
9 square feet	= 1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards	= 1 square rod (sq. rd.)
160 square rods	= 1 acre (A.)
640 acres	= 1 square mile (sq. mi.)

LIQUIDS

2 pints (pt.)	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

VOLUME

1728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)
231 cubic inches	= 1 gallon (gal.)
128 cubic feet of wood	= 1 cord

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